

## SEQUENCE LISTING

<110> Yocum, R. et al.

<120> MICROORGANISMS AND ASSAYS FOR THE IDENTIFICATION OF  
ANTIBIOTICS

<130> OGZ-001

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<150> US 60/227,860

<151> 2000-08-24

<160> 76

<170> PatentIn Ver. 2.0

<210> 1

<211> 777

<212> DNA

<213> Bacillus subtilis

<220>

<221> CDS

<222> (1)..(774)

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cac	tcc	ggg	ctt	atg	ttt	gaa	cag	ata	gat	ggc	att	att	att	tcg	tca	192
His	Ser	Gly	Leu	Met	Phe	Glu	Gln	Ile	Asp	Gly	Ile	Ile	Ile	Ser	Ser	
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Val	Val	Pro	Pro	Ile	Met	Phe	Ala	Leu	Glu	Arg	Met	Cys	Thr	Lys	Tyr	
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ttt	cat	atc	gag	cct	caa	att	gtt	ggt	cca	ggt	atg	aaa	acc	ggt	tta	288
Phe	His	Ile	Glu	Pro	Gln	Ile	Val	Gly	Pro	Gly	Met	Lys	Thr	Gly	Leu	
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			100					105					110			

aat	gct	gtc	gct	gcg	ata	cac	ttg	tac	ggc	aat	cca	tta	att	gtt	gtc	384
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Asn Ala Val Ala Ala Ile His Leu Tyr Gly Asn Pro Leu Ile Val Val  
 115 120 125

gat ttc gga acc gcc aca acg tac tgc tat att gat gaa aac aaa caa 432  
 Asp Phe Gly Thr Ala Thr Tyr Cys Tyr Ile Asp Glu Asn Lys Gln  
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tac atg ggc ggg gcg att gcc cct ggg att aca att tcg aca gag gcg 480  
 Tyr Met Gly Gly Ala Ile Ala Pro Gly Ile Thr Ile Ser Thr Glu Ala  
 145 150 155 160

ctt tac tcg cgt gca gca aag ctt cct cgt atc gaa atc acc cgg ccc 528  
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 165 170 175

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 Asp Asn Ile Ile Gly Lys Asn Thr Val Ser Ala Met Gln Ser Gly Ile  
 180 185 190

tta ttt ggc tat gtc ggc caa gtg gaa gga atc gtt aag cga atg aaa 624  
 Leu Phe Gly Tyr Val Gly Gln Val Glu Gly Ile Val Lys Arg Met Lys  
 195 200 205

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 210 215 220

ccg ctc att gcg aac gaa tca gat tgt ata gac atc gtt gat cca ttc 720  
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 225 230 235 240

tta acc cta aaa ggg ctg gaa ttg att tat gaa aga aac cgc gta gga 768  
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 <213> Bacillus subtilis

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His Lys Thr Glu Asp Glu Phe Gly Met Ile Leu Arg Ser Leu Phe Asp  
 35 40 45

His Ser Gly Leu Met Phe Glu Gln Ile Asp Gly Ile Ile Ile Ser Ser  
 50 55 60

Val Val Pro Pro Ile Met Phe Ala Leu Glu Arg Met Cys Thr Lys Tyr  
 65 70 75 80

Phe His Ile Glu Pro Gln Ile Val Gly Pro Gly Met Lys Thr Gly Leu

85 90 95  
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 100 105 110  
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 Asp Phe Gly Thr Ala Thr Thr Tyr Cys Tyr Ile Asp Glu Asn Lys Gln  
 130 135 140  
 Tyr Met Gly Gly Ala Ile Ala Pro Gly Ile Thr Ile Ser Thr Glu Ala  
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 165 170 175  
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 195 200 205  
 Trp Gln Ala Lys Gln Asp Leu Lys Val Ile Ala Thr Gly Gly Leu Ala  
 210 215 220  
 Pro Leu Ile Ala Asn Glu Ser Asp Cys Ile Asp Ile Val Asp Pro Phe  
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 245 250 255  
 Ser Val  
  
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 <213> Clostridium acetobutylicum  
  
 <400> 3  
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 Ile Tyr Asn Asp Thr Lys Leu Thr Ala Glu Trp Arg Leu Ser Thr Asp  
 35 40 45  
 Val Leu Arg Ser Ala Asp Glu Tyr Gly Ile Gln Val Met Asn Leu Phe  
 50 55 60  
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 Ser Val Val Pro Asn Ile Met Tyr Ser Leu Glu His Met Ile Arg Lys  
 85 90 95  
 Tyr Phe Lys Ile Asn Pro Leu Val Val Gly Pro Gly Ile Lys Thr Gly

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100              105              110
Ile Asn Ile Lys Tyr Asp Asn Pro Lys Glu Val Gly Ala Asp Arg Ile
115              120              125
Val Asn Ala Val Ala Ala His Glu Ile Tyr Lys Arg Ser Leu Ile Ile
130              135              140
Ile Asp Phe Gly Thr Ala Thr Thr Phe Cys Ala Val Arg Glu Asn Gly
145              150              155              160
Asp Tyr Leu Gly Gly Ala Ile Cys Pro Gly Ile Lys Val Ser Ser Glu
165              170              175
Ala Leu Phe Glu Lys Ala Ala Lys Leu Pro Arg Val Glu Leu Ile Lys
180              185              190
Pro Ala Tyr Ala Ile Cys Lys Asn Thr Ile Ser Ser Ile Gln Ser Gly
195              200              205
Ile Val Tyr Arg Tyr Leu Arg Gln Val Lys Tyr Leu Phe Glu Lys Leu
210              215              220
Lys Glu Asn Leu Pro Asp Gly Arg Arg Thr Arg Thr Ser Leu Val Leu
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Ala Thr Gly Gly Leu Ala Lys Leu Ile Asn
245              250

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<211> 265
<212> PRT
<213> Streptomyces coelicolor

<400> 4
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Arg Arg Thr Ala Asp Glu Leu Ala Val Leu Leu Gln Gly Leu Met Gly
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Met His Pro Leu Leu Gly Asp Glu Leu Gly Asp Gly Ile Asp Gly Ile
50          55          60
Ala Ile Cys Ala Thr Val Pro Ser Val Leu His Glu Leu Arg Glu Val
65          70          75          80
Thr Arg Arg Tyr Tyr Gly Asp Val Pro Ala Val Leu Val Glu Pro Gly
85          90          95
Val Lys Thr Gly Val Pro Ile Leu Thr Asp His Pro Lys Glu Val Gly
100         105         110
Ala Asp Arg Ile Ile Asn Ala Val Ala Ala Val Glu Leu Tyr Gly Gly
115         120         125
Pro Ala Ile Val Val Asp Phe Gly Thr Ala Thr Thr Phe Asp Ala Val

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130              135              140
Ser Ala Arg Gly Glu Tyr Ile Gly Gly Val Ile Ala Pro Gly Ile Glu
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Glu Val Ala Arg Pro Arg Ser Val Ile Gly Lys Asn Thr Val Glu Ala
180              185              190
Met Gln Ser Gly Ile Val Tyr Gly Phe Ala Gly Gln Val Asp Gly Val
195              200              205
Val Asn Arg Met Ala Arg Glu Leu Ala Asp Asp Pro Asp Asp Val Thr
210              215              220
Val Ile Ala Thr Gly Gly Leu Ala Pro Met Val Leu Gly Glu Ser Ser
225              230              235              240
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Val Tyr Glu Arg Asn Val Ser Arg Met
260              265

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<213> Mycobacterium tuberculosis

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Arg Thr Glu Ser Glu Val Thr Ala Asp Glu Leu Ala Leu Thr Ile Asp
35     40     45
Gly Leu Ile Gly Glu Asp Ser Glu Arg Leu Thr Gly Thr Ala Ala Leu
50     55     60
Ser Thr Val Pro Ser Val Leu His Glu Val Arg Ile Met Leu Asp Gln
65     70     75     80
Tyr Trp Pro Ser Val Pro His Val Leu Ile Glu Pro Gly Val Arg Thr
85     90     95
Gly Ile Pro Leu Leu Val Asp Asn Pro Lys Glu Val Gly Ala Asp Arg
100    105    110
Ile Val Asn Cys Leu Ala Ala Tyr Asp Arg Phe Arg Lys Ala Ala Ile
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Val Val Asp Phe Gly Ser Ser Ile Cys Val Asp Val Val Ser Ala Lys
130    135    140
Gly Glu Phe Leu Gly Gly Ala Ile Ala Pro Gly Val Gln Val Ser Ser

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145                      150                      155                      160  
 Asp Ala Ala Ala Ala Arg Ser Ala Ala Leu Arg Arg Val Glu Leu Ala  
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 Arg Pro Arg Ser Val Val Gly Lys Asn Thr Val Glu Cys Met Gln Ala  
                                  180                      185                      190  
 Gly Ala Val Phe Gly Phe Ala Gly Leu Val Asp Gly Leu Val Gly Arg  
                                  195                      200                      205  
 Ile Arg Glu Asp Val Ser Gly Phe Ser Val Asp His Asp Val Ala Ile  
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 Val Ala Thr Gly His Thr Ala Pro Leu Leu Leu Pro Glu Leu His Thr  
 225                                   230                      235                      240  
 Val Asp His Tyr Asp Gln His Leu Thr Leu Gln Gly Leu Arg Leu Val  
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 Arg Arg Thr Ala Asp Glu Tyr Phe Val Trp Leu Asn Thr Leu Met Gln  
                                  35                                    40                                    45  
 Leu Lys Gly Leu Gln Gly Arg Ile Ser Glu Ala Ile Ile Ser Ser Thr  
                                  50                                    55                                    60  
 Ala Pro Arg Val Val Phe Asn Leu Arg Val Leu Cys Asn Arg Tyr Phe  
                                  65                                    70                                    75                                    80  
 Asp Cys Arg Pro Tyr Val Val Gly Lys Pro Gly Cys Glu Leu Pro Val  
                                  85                                    90                                    95  
 Ala Pro Arg Val Asp Pro Gly Thr Thr Val Gly Pro Asp Arg Leu Val  
                                  100                                    105                                    110  
 Asn Thr Val Ala Gly Tyr Asp Arg His Gly Gly Asp Leu Ile Val Val  
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 Asp Phe Gly Thr Ala Thr Thr Phe Asp Val Val Ala Pro Asp Gly Ala  
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 Tyr Ile Gly Gly Val Ile Ala Pro Gly Val Asn Leu Ser Leu Glu Ala  
 145                                    150                                    155                                    160  
 Leu His Met Ala Ala Ala Ala Leu Pro His Val Asp Val Thr Lys Pro

				165						170					175
Gln	Gly	Val	Ile	Gly	Thr	Asn	Thr	Val	Ala	Cys	Ile	Gln	Ser	Gly	Val
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Tyr	Trp	Gly	Tyr	Ile	Gly	Leu	Val	Glu	Gly	Ile	Val	Arg	Gln	Ile	Arg
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Met	Glu	Arg	Asp	Arg	Pro	Met	Lys	Val	Ile	Ala	Thr	Gly	Gly	Leu	Ala
	210					215					220				
Ser	Leu	Phe	Asp	Leu	Gly	Phe	Asp	Leu	Phe	Asp	Lys	Val	Glu	Asp	Asp
225					230					235				240	
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 <211> 255  
 <212> PRT  
 <213> Geobacter sulfurreducens

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 Ala Arg Thr Thr Asp Glu Tyr Gly Ile Leu Ile Asn Glu Leu Phe Arg  
 35 40 45  
 Leu Ala Gly Leu Gly Leu Asp Gln Ile Arg Ala Val Ile Ile Ser Ser  
 50 55 60  
 Val Val Pro Pro Leu Thr Gly Val Leu Glu Arg Leu Ser Leu Gly Tyr  
 65 70 75 80  
 Phe Gly Met Arg Pro Leu Val Val Gly Pro Gly Ile Lys Thr Gly Met  
 85 90 95  
 Pro Ile Gln Tyr Asp Asn Pro Arg Glu Val Gly Ala Asp Arg Ile Val  
 100 105 110  
 Asn Ala Val Ala Gly Tyr Glu Lys Tyr Arg Thr Ser Leu Ile Ile Val  
 115 120 125  
 Asp Phe Gly Thr Ala Thr Thr Phe Asp Tyr Val Asn Arg Lys Gly Glu  
 130 135 140  
 Tyr Cys Gly Gly Ala Ile Ala Pro Gly Leu Val Ile Ser Thr Glu Ala  
 145 150 155 160  
 Leu Phe Gln Arg Ala Ser Lys Leu Pro Arg Val Asp Ile Ile Arg Pro  
 165 170 175  
 Ser Ala Ile Ile Ala Arg Asn Thr Val Asn Ser Met Gln Ala Gly Ile

180 185 190

Tyr Tyr Gly Tyr Val Gly Leu Val Asp Glu Ile Val Thr Arg Met Lys  
195 200 205

Ala Glu Ser Lys Asp Ala Pro Arg Val Ile Ala Thr Gly Gly Leu Ala  
210 215 220

Ser Leu Ile Ala Pro Glu Ser Lys Thr Ile Glu Ala Val Glu Glu Tyr  
225 230 235 240

Leu Thr Leu Glu Gly Leu Arg Ile Leu Tyr Glu Arg Asn Arg Glu  
245 250 255

&lt;210&gt; 8

&lt;211&gt; 262

&lt;212&gt; PRT

&lt;213&gt; Deinococcus radiopugnans

&lt;400&gt; 8

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Val Leu Gly Leu Ala Asp Ala Ser Gly Ala Leu Thr His Thr Trp Arg  
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Ile Arg Thr Asn Arg Glu Met Leu Pro Asp Asp Leu Ala Leu Gln Leu  
35 40 45

His Gly Leu Phe Thr Leu Ala Gly Ala Pro Ile Pro Arg Ala Ala Val  
50 55 60

Leu Ser Ser Val Ala Pro Pro Val Gly Glu Asn Tyr Ala Leu Ala Leu  
65 70 75 80

Lys Arg His Phe Met Ile Asp Ala Phe Ala Val Ser Ala Glu Asn Leu  
85 90 95

Pro Asp Val Thr Val Glu Leu Asp Thr Pro Gly Ser Val Gly Ala Asp  
100 105 110

Arg Leu Cys Asn Leu Phe Gly Ala Glu Lys Tyr Leu Gly Gly Leu Asp  
115 120 125

Tyr Ala Val Val Val Asp Phe Gly Thr Ser Thr Asn Phe Asp Val Val  
130 135 140

Gly Arg Gly Arg Arg Phe Leu Gly Gly Ile Leu Ala Thr Gly Ala Gln  
145 150 155 160

Val Ser Ala Asp Ala Leu Phe Ala Arg Ala Ala Lys Leu Pro Arg Ile  
165 170 175

Thr Leu Gln Ala Pro Glu Thr Ala Ile Gly Lys Asn Thr Val His Ala  
180 185 190

Leu Gln Ser Gly Leu Val Phe Gly Tyr Ala Glu Met Val Asp Gly Leu  
195 200 205

Leu Arg Arg Ile Arg Ala Glu Leu Pro Gly Glu Ala Val Ala Val Ala



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 Thr Gly Gly Phe Ser Arg Thr Val Gln Gly Ile Cys Gln Glu Ile Asp  
 225                      230                      235                      240  
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 <213> Thermotoga maritima  
  
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 Phe Gln Thr Glu Asp Glu Leu Phe Ser His Leu His Pro Leu Leu Gly  
                     35                      40                      45  
 Asp Ala Met Arg Glu Ile Lys Gly Ile Gly Val Ala Ser Val Val Pro  
   50                      55                      60  
 Thr Gln Asn Thr Val Ile Glu Arg Phe Ser Gln Lys Tyr Phe His Ile  
   65                      70                      75                      80  
 Ser Pro Ile Trp Val Lys Ala Lys Asn Gly Cys Val Lys Trp Asn Val  
                     85                      90                      95  
 Lys Asn Pro Ser Glu Val Gly Ala Asp Arg Val Ala Asn Val Val Ala  
                     100                      105                      110  
 Phe Val Lys Glu Tyr Gly Lys Asn Gly Ile Ile Ile Asp Met Gly Thr  
                     115                      120                      125  
 Ala Thr Thr Val Asp Leu Val Val Asn Gly Ser Tyr Glu Gly Gly Ala  
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 Ala Lys Leu Pro Leu Val Glu Val Lys Pro Ala Asp Phe Val Val Gly  
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 Lys Asp Thr Glu Glu Asn Ile Arg Leu Gly Val Val Asn Gly Ser Val  
                     180                      185                      190  
 Tyr Ala Leu Glu Gly Ile Ile Gly Arg Ile Lys Glu Val Tyr Gly Asp  
                     195                      200                      205  
 Leu Pro Val Val Leu Thr Gly Gly Gln Ser Lys Ile Val Lys Asp Met  
   210                      215                      220  
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 <213> Treponema pallidum  
  
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 Pro Asp Ala Arg Lys Thr Gln Asp Glu Tyr Ser Leu Leu Ile His Ala  
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 Leu Cys Glu Arg Ala Gly Val Gly Arg Ala Ser Leu Arg Asp Ala Phe  
   50                                  55                                  60  
  
 Ile Ser Ser Val Val Pro Val Leu Thr Lys Thr Ile Ala Asp Ala Val  
   65                                  70                                  75                                  80  
  
 Ala Gln Ile Ser Gly Val Gln Pro Val Val Phe Gly Pro Trp Ala Tyr  
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 Glu His Leu Pro Val Arg Ile Pro Glu Pro Val Arg Ala Glu Ile Gly  
                                   100                                  105                                  110  
  
 Thr Asp Leu Val Ala Asn Ala Val Ala Ala Tyr Val His Phe Arg Ser  
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 Ala Cys Val Val Val Asp Cys Gly Thr Ala Leu Thr Phe Thr Ala Val  
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 Asp Gly Thr Gly Leu Ile Gln Gly Val Ala Ile Ala Pro Gly Leu Arg  
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 Thr Ala Val Gln Ser Leu His Thr Gly Thr Ala Gln Leu Pro Leu Val  
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 Pro Leu Ala Leu Pro Asp Ser Val Leu Gly Lys Asp Thr Thr His Ala  
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 Ile Ala Gln Cys Gln Lys Glu Leu Gly Cys Arg Cys Ala Ala Val Ile  
   210                                  215                                  220  
  
 Thr Gly Gly Leu Ser Arg Leu Phe Ser Ser Glu Val Asp Phe Pro Pro  
   225                                  230                                  235                                  240  
  
 Ile Asp Ala Gln Leu Thr Leu Ser Gly Leu Ala His Ile Ala Arg Leu  
                                   245                                  250                                  255  
  
 Val Pro Thr Ser Leu Leu Pro Pro Ala Thr Val Ser Gly Ser Ser Gly

260

265

270

Asn

&lt;210&gt; 11

&lt;211&gt; 262

&lt;212&gt; PRT

&lt;213&gt; Borrelia burgdorferi

&lt;400&gt; 11

Met	Asn	Lys	Pro	Leu	Leu	Ser	Glu	Leu	Ile	Ile	Asp	Ile	Gly	Asn	Thr
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Ser	Ile	Ala	Phe	Ala	Leu	Phe	Lys	Asp	Asn	Gln	Val	Asn	Leu	Phe	Ile
		20						25					30		

Lys	Met	Lys	Thr	Asn	Leu	Met	Leu	Arg	Tyr	Asp	Glu	Val	Tyr	Ser	Phe
		35					40					45			

Phe	Glu	Glu	Asn	Phe	Asp	Phe	Asn	Val	Asn	Lys	Val	Phe	Ile	Ser	Ser
	50					55					60				

Val	Val	Pro	Ile	Leu	Asn	Glu	Thr	Phe	Lys	Asn	Val	Ile	Phe	Ser	Phe
65					70					75					80

Phe	Lys	Ile	Lys	Pro	Leu	Phe	Ile	Gly	Phe	Asp	Leu	Asn	Tyr	Asp	Leu
				85					90					95	

Thr	Phe	Asn	Pro	Tyr	Lys	Ser	Asp	Lys	Phe	Leu	Leu	Gly	Ser	Asp	Val
		100						105					110		

Phe	Ala	Asn	Leu	Val	Ala	Ala	Ile	Glu	Asn	Tyr	Ser	Phe	Glu	Asn	Val
		115					120					125			

Leu	Val	Val	Asp	Leu	Gly	Thr	Ala	Cys	Thr	Ile	Phe	Ala	Val	Ser	Arg
130						135					140				

Gln	Asp	Gly	Ile	Leu	Gly	Gly	Ile	Ile	Asn	Ser	Gly	Pro	Leu	Ile	Asn
145					150					155					160

Phe	Asn	Ser	Leu	Leu	Asp	Asn	Ala	Tyr	Leu	Ile	Lys	Lys	Phe	Pro	Ile
			165						170					175	

Ser	Thr	Pro	Asn	Asn	Leu	Leu	Glu	Arg	Thr	Thr	Ser	Gly	Ser	Val	Asn
			180					185					190		

Ser	Gly	Leu	Phe	Tyr	Gln	Tyr	Lys	Tyr	Leu	Ile	Glu	Gly	Val	Tyr	Arg
		195					200					205			

Asp	Ile	Lys	Gln	Met	Tyr	Lys	Lys	Lys	Phe	Asn	Leu	Ile	Ile	Thr	Gly
210						215					220				

Gly	Asn	Ala	Asp	Leu	Ile	Leu	Ser	Leu	Ile	Glu	Ile	Glu	Phe	Ile	Phe
225					230					235					240

Asn	Ile	His	Leu	Thr	Val	Glu	Gly	Val	Arg	Ile	Leu	Gly	Asn	Ser	Ile
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Asp Phe Lys Phe Val Asn

260

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 <213> Aquifex aeolicus

<400> 12  
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                   20                  25                  30  
 Glu Phe Leu Lys Glu Glu Phe Pro Lys Leu Lys Ala Leu Gly Ile Ser  
                   35                  40                  45  
 Val Lys Gln Ser Phe Ser Glu Lys Val Arg Gly Lys Ile Pro Lys Ile  
           50                  55                  60  
 Lys Phe Leu Lys Lys Glu Asn Phe Pro Ile Gln Val Asp Tyr Lys Thr  
           65                  70                  75                  80  
 Pro Glu Thr Leu Gly Thr Asp Arg Val Ala Leu Ala Tyr Ser Ala Lys  
                   85                  90                  95  
 Lys Phe Tyr Gly Lys Asn Val Val Val Ile Ser Ala Gly Thr Ala Leu  
           100                  105                  110  
 Val Ile Asp Leu Val Leu Glu Gly Lys Phe Lys Gly Gly Phe Ile Thr  
           115                  120                  125  
 Leu Gly Leu Gly Lys Lys Leu Lys Ile Leu Ser Asp Leu Ala Glu Gly  
           130                  135                  140  
 Ile Pro Glu Phe Phe Pro Glu Glu Val Glu Ile Phe Leu Gly Arg Ser  
           145                  150                  155                  160  
 Thr Arg Glu Cys Val Leu Gly Gly Ala Tyr Arg Glu Ser Thr Glu Phe  
                   165                  170                  175  
 Ile Lys Ser Thr Leu Lys Leu Trp Arg Lys Val Phe Lys Arg Lys Phe  
           180                  185                  190  
 Lys Val Val Ile Thr Gly Gly Glu Gly Lys Tyr Phe Ser Lys Phe Gly  
           195                  200                  205  
 Ile Tyr Asp Pro Leu Leu Val His Arg Gly Met Arg Asn Leu Leu Tyr  
           210                  215                  220  
 Leu Tyr His Arg Ile  
 225

<210> 13  
 <211> 257  
 <212> PRT  
 <213> Synechocystis sp.

<400> 13

Met Glu Thr Ser Lys Pro Gly Cys Gly Leu Ala Leu Asp Asn Asp Lys  
 1 5 10 15  
 Gln Lys Pro Trp Leu Gly Leu Met Ile Gly Asn Ser Arg Leu His Trp  
 20 25 30  
 Ala Tyr Cys Ser Gly Asn Ala Pro Leu Gln Thr Trp Val Thr Asp Tyr  
 35 40 45  
 Asn Pro Lys Ser Ala Gln Leu Pro Val Leu Leu Gly Lys Val Pro Leu  
 50 55 60  
 Met Leu Ala Ser Val Val Pro Glu Gln Thr Glu Val Trp Arg Val Tyr  
 65 70 75 80  
 Gln Pro Lys Ile Leu Thr Leu Lys Asn Leu Pro Leu Val Asn Leu Tyr  
 85 90 95  
 Pro Ser Phe Gly Ile Asp Arg Ala Leu Ala Gly Leu Gly Thr Gly Leu  
 100 105 110  
 Thr Tyr Gly Phe Pro Cys Leu Val Val Asp Gly Gly Thr Ala Leu Thr  
 115 120 125  
 Ile Thr Gly Phe Asp Gln Asp Lys Lys Leu Val Gly Gly Ala Ile Leu  
 130 135 140  
 Pro Gly Leu Gly Leu Gln Leu Ala Thr Leu Gly Asp Arg Leu Ala Ala  
 145 150 155 160  
 Leu Pro Lys Leu Glu Met Asp Gln Leu Thr Glu Leu Pro Asp Arg Trp  
 165 170 175  
 Ala Leu Asp Thr Pro Ser Ala Ile Phe Ser Gly Val Val Tyr Gly Val  
 180 185 190  
 Leu Gly Ala Leu Gln Ser Tyr Leu Gln Asp Trp Gln Lys Leu Phe Pro  
 195 200 205  
 Gly Ala Ala Met Val Ile Thr Gly Gly Asp Gly Lys Ile Leu His Gly  
 210 215 220  
 Phe Leu Lys Glu His Ser Pro Asn Leu Ser Val Ala Trp Asp Asp Asn  
 225 230 235 240  
 Leu Ile Phe Leu Gly Met Ala Ala Ile His His Gly Asp Arg Pro Ile  
 245 250 255

Cys

<210> 14  
 <211> 223  
 <212> PRT  
 <213> Helicobacter pylori

<400> 14  
 Met Pro Ala Arg Gln Ser Phe Thr Asp Leu Lys Asn Leu Val Leu Cys  
 1 5 10 15

Asp Ile Gly Asn Thr Arg Ile His Phe Ala Gln Asn Tyr Gln Leu Phe  
                   20                                  25                                  30  
 Ser Ser Ala Lys Glu Asp Leu Lys Arg Leu Gly Ile Gln Lys Glu Ile  
                   35                                  40                                  45  
 Phe Tyr Ile Ser Val Asn Glu Glu Asn Glu Lys Ala Leu Leu Asn Cys  
                   50                                  55                                  60  
 Tyr Pro Asn Ala Lys Asn Ile Ala Gly Phe Phe His Leu Glu Thr Asp  
                   65                                  70                                  75                                  80  
 Tyr Val Gly Leu Gly Ile Asp Arg Gln Met Ala Cys Leu Ala Val Asn  
                                   85                                  90                                  95  
 Asn Gly Val Val Val Asp Ala Gly Ser Ala Ile Thr Ile Asp Leu Ile  
                                   100                                  105                                  110  
 Lys Glu Gly Lys His Leu Gly Gly Cys Ile Leu Pro Gly Leu Ala Gln  
                                   115                                  120                                  125  
 Tyr Ile His Ala Tyr Lys Lys Ser Ala Lys Ile Leu Glu Gln Pro Phe  
                   130                                  135                                  140  
 Lys Ala Leu Asp Ser Leu Glu Val Leu Pro Lys Ser Thr Arg Asp Ala  
                   145                                  150                                  155                                  160  
 Val Asn Tyr Gly Met Val Leu Ser Val Ile Ala Cys Ile Gln His Leu  
                                   165                                  170                                  175  
 Ala Lys Asn Gln Lys Ile Tyr Leu Cys Gly Gly Asp Ala Lys Tyr Leu  
                                   180                                  185                                  190  
 Ser Ala Phe Leu Pro His Ser Val Cys Lys Glu Arg Leu Val Phe Asp  
                   195                                  200                                  205  
 Gly Met Glu Ile Ala Leu Lys Lys Ala Gly Ile Leu Glu Cys Lys  
                   210                                  215                                  220

<210> 15  
 <211> 267  
 <212> PRT  
 <213> Bordetella pertussis

<400> 15  
 Met Ile Ile Leu Ile Asp Ser Gly Asn Ser Arg Leu Lys Val Gly Trp  
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 Phe Asp Pro Asp Ala Pro Gln Ala Ala Arg Glu Pro Ala Pro Val Ala  
                   20                                  25                                  30  
 Phe Asp Asn Leu Asp Leu Asp Ala Leu Gly Arg Trp Leu Ala Thr Leu  
                   35                                  40                                  45  
 Pro Arg Arg Pro Gln Arg Ala Leu Gly Val Asn Val Ala Gly Leu Ala  
                   50                                  55                                  60  
 Arg Gly Glu Ala Ile Ala Ala Thr Leu Arg Ala Gly Gly Cys Asp Ile  
                   65                                  70                                  75                                  80

Arg Trp Leu Arg Ala Gln Pro Leu Ala Met Gly Leu Arg Asn Gly Tyr  
                             85                            90                            95  
 Arg Asn Pro Asp Gln Leu Gly Ala Asp Arg Trp Ala Cys Met Val Gly  
                             100                            105                            110  
 Val Leu Ala Arg Gln Pro Ser Val His Pro Pro Leu Leu Val Ala Ser  
                             115                            120                            125  
 Phe Gly Thr Ala Thr Thr Leu Asp Thr Ile Gly Pro Asp Asn Val Phe  
                             130                            135                            140  
 Pro Gly Gly Leu Ile Leu Pro Gly Pro Ala Met Met Arg Gly Ala Leu  
                             145                            150                            155                            160  
 Ala Tyr Gly Thr Ala His Leu Pro Leu Ala Asp Gly Leu Val Ala Asp  
                             165                            170                            175  
 Tyr Pro Ile Asp Thr His Gln Ala Ile Ala Ser Gly Ile Ala Ala Ala  
                             180                            185                            190  
 Gln Ala Gly Ala Ile Val Arg Gln Trp Leu Ala Gly Arg Gln Arg Tyr  
                             195                            200                            205  
 Gly Gln Ala Pro Glu Ile Tyr Val Ala Gly Gly Gly Trp Pro Glu Val  
                             210                            215                            220  
 Arg Gln Glu Ala Glu Arg Leu Leu Ala Val Thr Gly Ala Ala Phe Gly  
                             225                            230                            235                            240  
 Ala Thr Pro Gln Pro Thr Tyr Leu Asp Ser Pro Val Leu Asp Gly Leu  
                             245                            250                            255  
 Ala Ala Leu Ala Ala Gln Gly Ala Pro Thr Ala  
                             260                            265

<210> 16  
 <211> 702  
 <212> DNA  
 <213> Bacillus subtilis

<220>  
 <221> CDS  
 <222> (1)..(699)

<400> 16  
 ttg tta ctg gtt atc gat gtg ggg aac acc aat act gta ctt ggt gta 48  
 Met Leu Leu Val Ile Asp Val Gly Asn Thr Asn Thr Val Leu Gly Val  
           1                            5                            10                            15  
 tat cat gat gga aaa tta gaa tat cac tgg cgt ata gaa aca agc agg 96  
 Tyr His Asp Gly Lys Leu Glu Tyr His Trp Arg Ile Glu Thr Ser Arg  
                             20                            25                            30  
 cat aaa aca gaa gat gag ttt ggg atg att ttg cgc tcc tta ttt gat 144  
 His Lys Thr Glu Asp Glu Phe Gly Met Ile Leu Arg Ser Leu Phe Asp  
                             35                            40                            45  
 cac tcc ggg ctt atg ttt gaa cag ata gat ggc att att att tcg tca 192  
 His Ser Gly Leu Met Phe Glu Gln Ile Asp Gly Ile Ile Ile Ser Ser

50	55	60	
gta gtg ccg cca atc atg ttt gcg tta gaa aga atg tgc aca aaa tac			240
Val Val Pro Pro Ile Met Phe Ala Leu Glu Arg Met Cys Thr Lys Tyr			
65	70	75	80
ttt cat atc gag cct caa att gtt ggt cca ggt atg aaa acc ggt tta			288
Phe His Ile Glu Pro Gln Ile Val Gly Pro Gly Met Lys Thr Gly Leu			
	85	90	95
aat ata aaa tat gac aat ccg aaa gaa gta ggg gca gac aga atc gta			336
Asn Ile Lys Tyr Asp Asn Pro Lys Glu Val Gly Ala Asp Arg Ile Val			
	100	105	110
aat gct gtc gct gcg ata cac ttg tac ggc aat cca tta att gtt gtc			384
Asn Ala Val Ala Ala Ile His Leu Tyr Gly Asn Pro Leu Ile Val Val			
	115	120	125
gat ttc gga acc gcc aca acg tac tgc tat att gat gaa aac aaa caa			432
Asp Phe Gly Thr Ala Thr Thr Tyr Cys Tyr Ile Asp Glu Asn Lys Gln			
	130	135	140
tac atg ggc ggg gcg att gcc cct ggg att aca att tcg aca gag gcg			480
Tyr Met Gly Gly Ala Ile Ala Pro Gly Ile Thr Ile Ser Thr Glu Ala			
	145	150	155
ctt tac tcg cgt gca gca aag ctt cct cgt atc gaa atc acc cgg ccc			528
Leu Tyr Ser Arg Ala Ala Lys Leu Pro Arg Ile Glu Ile Thr Arg Pro			
	165	170	175
gac aat att atc gga aaa aac act gtt agc gcg atg caa tct gga att			576
Asp Asn Ile Ile Gly Lys Asn Thr Val Ser Ala Met Gln Ser Gly Ile			
	180	185	190
tta ttt ggc tat gtc ggc caa gtg gaa gga atc gtt aag cga atg aaa			624
Leu Phe Gly Tyr Val Gly Gln Val Glu Gly Ile Val Lys Arg Met Lys			
	195	200	205
tgg cag gca aaa cag gac cca agg tca ttg cga cag gag gcc tgg cgc			672
Trp Gln Ala Lys Gln Asp Pro Arg Ser Leu Arg Gln Glu Ala Trp Arg			
	210	215	220
cgc tca ttg cga acg aat cag att gta tag			702
Arg Ser Leu Arg Thr Asn Gln Ile Val			
	225	230	

&lt;210&gt; 17

&lt;211&gt; 233

&lt;212&gt; PRT

&lt;213&gt; Bacillus subtilis

&lt;400&gt; 17

Met	Leu	Leu	Val	Ile	Asp	Val	Gly	Asn	Thr	Asn	Thr	Val	Leu	Gly	Val
1				5				10					15		

Tyr	His	Asp	Gly	Lys	Leu	Glu	Tyr	His	Trp	Arg	Ile	Glu	Thr	Ser	Arg
			20					25				30			

His	Lys	Thr	Glu	Asp	Glu	Phe	Gly	Met	Ile	Leu	Arg	Ser	Leu	Phe	Asp
			35				40					45			



His Ser Gly Leu Met Phe Glu Gln Ile Asp Gly Ile Ile Ile Ser Ser  
 50 55 60  
 Val Val Pro Pro Ile Met Phe Ala Leu Glu Arg Met Cys Thr Lys Tyr  
 65 70 75 80  
 Phe His Ile Glu Pro Gln Ile Val Gly Pro Gly Met Lys Thr Gly Leu  
 85 90 95  
 Asn Ile Lys Tyr Asp Asn Pro Lys Glu Val Gly Ala Asp Arg Ile Val  
 100 105 110  
 Asn Ala Val Ala Ala Ile His Leu Tyr Gly Asn Pro Leu Ile Val Val  
 115 120 125  
 Asp Phe Gly Thr Ala Thr Thr Tyr Cys Tyr Ile Asp Glu Asn Lys Gln  
 130 135 140  
 Tyr Met Gly Gly Ala Ile Ala Pro Gly Ile Thr Ile Ser Thr Glu Ala  
 145 150 155 160  
 Leu Tyr Ser Arg Ala Ala Lys Leu Pro Arg Ile Glu Ile Thr Arg Pro  
 165 170 175  
 Asp Asn Ile Ile Gly Lys Asn Thr Val Ser Ala Met Gln Ser Gly Ile  
 180 185 190  
 Leu Phe Gly Tyr Val Gly Gln Val Glu Gly Ile Val Lys Arg Met Lys  
 195 200 205  
 Trp Gln Ala Lys Gln Asp Pro Arg Ser Leu Arg Gln Glu Ala Trp Arg  
 210 215 220  
 Arg Ser Leu Arg Thr Asn Gln Ile Val  
 225 230

<210> 18  
 <211> 163  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:promoter  
 sequence

<220>  
 <221> -35\_signal  
 <222> (113)..(118)

<220>  
 <221> -10\_signal  
 <222> (136)..(141)

<400> 18  
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 tacatccaga acaacctctg ctaaaattcc tgaaaaattt tgcaaaaagt tgttgacttt 120  
 atctacaagg tgtgtgtataa taatcttaac aacagcagga cgc 163

<210> 19  
 <211> 194  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:promoter  
 sequence

<220>  
 <221> -35\_signal  
 <222> (136)..(141)

<220>  
 <221> -10\_signal  
 <222> (159)..(164)

<400> 19  
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 tattttctccc ttgaggggta caaagaggtg tccctagaag agatccacgc tgtgtaaaaa 120  
 ttttacaaaa aggtattgac tttccctaca ggggtgtgtaa taatttaatt acaggcgggg 180  
 gcaaccccgcc ctgt 194

<210> 20  
 <211> 248  
 <212> PRT  
 <213> Pseudomonas aeruginosa

<400> 20  
 Met Ile Leu Glu Leu Asp Cys Gly Asn Ser Leu Ile Lys Trp Arg Val  
 1 5 10 15  
 Ile Glu Gly Ala Ala Arg Ser Val Ala Gly Gly Leu Ala Glu Ser Asp  
 20 25 30  
 Asp Ala Leu Val Glu Gln Leu Thr Ser Gln Gln Ala Leu Pro Val Arg  
 35 40 45  
 Ala Cys Arg Leu Val Ser Val Arg Ser Glu Gln Glu Thr Ser Gln Leu  
 50 55 60  
 Val Ala Arg Leu Glu Gln Leu Phe Pro Val Ser Ala Leu Val Ala Ser  
 65 70 75 80  
 Ser Gly Lys Gln Leu Ala Gly Val Arg Asn Gly Tyr Leu Asp Tyr Gln  
 85 90 95  
 Arg Leu Gly Leu Asp Arg Trp Leu Ala Leu Val Ala Ala His His Leu  
 100 105 110  
 Ala Lys Lys Ala Cys Leu Val Ile Asp Leu Gly Thr Ala Val Thr Ser  
 115 120 125  
 Asp Leu Val Ala Ala Asp Gly Val His Leu Gly Gly Tyr Ile Cys Pro  
 130 135 140

Gly Met Thr Leu Met Arg Ser Gln Leu Arg Thr His Thr Arg Arg Ile  
 145 150 155 160  
 Arg Tyr Asp Asp Ala Glu Ala Arg Arg Ala Leu Ala Ser Leu Gln Pro  
 165 170 175  
 Gly Gln Ala Thr Ala Glu Ala Val Glu Arg Gly Cys Leu Leu Met Leu  
 180 185 190  
 Arg Gly Phe Val Arg Glu Gln Tyr Ala Met Ala Cys Glu Leu Leu Gly  
 195 200 205  
 Pro Asp Cys Glu Ile Phe Leu Thr Gly Gly Asp Ala Glu Leu Val Arg  
 210 215 220  
 Asp Glu Leu Ala Gly Ala Arg Ile Met Pro Asp Leu Val Phe Val Gly  
 225 230 235 240  
 Leu Ala Leu Ala Cys Pro Ile Glu  
 245

<210> 21  
 <211> 209  
 <212> PRT  
 <213> Campylobacter jejuni

<400> 21  
 Met Leu Leu Cys Asp Ile Gly Asn Ser Asn Ala Asn Phe Leu Asp Asp  
 1 5 10 15  
 Asn Lys Tyr Phe Thr Leu Asn Ile Asp Gln Phe Leu Glu Phe Lys Asn  
 20 25 30  
 Glu Gln Lys Ile Phe Tyr Ile Asn Val Asn Glu His Leu Lys Glu His  
 35 40 45  
 Leu Lys Asn Gln Lys Asn Phe Ile Asn Leu Glu Pro Tyr Phe Leu Phe  
 50 55 60  
 Asp Thr Ile Tyr Gln Gly Leu Gly Ile Asp Arg Ile Ala Ala Cys Tyr  
 65 70 75 80  
 Thr Ile Glu Asp Gly Val Val Val Asp Ala Gly Ser Ala Ile Thr Ile  
 85 90 95  
 Asp Ile Ile Ser Asn Ser Ile His Leu Gly Gly Phe Ile Leu Pro Gly  
 100 105 110  
 Ile Ala Asn Tyr Lys Lys Ile Tyr Ser His Ile Ser Pro Arg Leu Lys  
 115 120 125  
 Ser Glu Phe Asn Thr Gln Val Ser Leu Asp Ala Phe Pro Gln Lys Thr  
 130 135 140  
 Met Asp Ala Leu Ser Tyr Gly Val Phe Lys Gly Ile Tyr Leu Leu Ile  
 145 150 155 160  
 Lys Asp Ala Ala Gln Asn Lys Lys Leu Tyr Phe Thr Gly Gly Asp Gly  
 165 170 175

Gln Phe Leu Ala Asn Tyr Phe Asp His Ala Ile Tyr Asp Lys Leu Leu  
 180 185 190

Ile Phe Arg Gly Met Lys Lys Ile Ile Lys Glu Asn Pro Asn Leu Leu  
 195 200 205

Tyr

<210> 22

<211> 592

<212> PRT

<213> Neisseria meningitidis

<400> 22

Met Thr Val Leu Lys Pro Ser His Trp Arg Val Leu Ala Glu Leu Ala  
 1 5 10 15

Asp Gly Leu Pro Gln His Val Ser Gln Leu Ala Arg Met Ala Asp Met  
 20 25 30

Lys Pro Gln Gln Leu Asn Gly Phe Trp Gln Gln Met Pro Ala His Ile  
 35 40 45

Arg Gly Leu Leu Arg Gln His Asp Gly Tyr Trp Arg Leu Val Arg Pro  
 50 55 60

Leu Ala Val Phe Asp Ala Glu Gly Leu Arg Glu Leu Gly Glu Arg Ser  
 65 70 75 80

Gly Phe Gln Thr Ala Leu Lys His Glu Cys Ala Ser Ser Asn Asp Glu  
 85 90 95

Ile Leu Glu Leu Ala Arg Ile Ala Pro Asp Lys Ala His Lys Thr Ile  
 100 105 110

Cys Val Thr His Leu Gln Ser Lys Gly Arg Gly Arg Gln Gly Arg Lys  
 115 120 125

Trp Ser His Arg Leu Gly Glu Cys Leu Met Phe Ser Phe Gly Trp Val  
 130 135 140

Phe Asp Arg Pro Gln Tyr Glu Leu Gly Ser Leu Ser Pro Val Ala Ala  
 145 150 155 160

Val Ala Cys Arg Arg Ala Leu Ser Arg Leu Gly Leu Lys Thr Gln Ile  
 165 170 175

Lys Trp Pro Asn Asp Leu Val Val Gly Arg Asp Lys Leu Gly Gly Ile  
 180 185 190

Leu Ile Glu Thr Val Arg Thr Gly Gly Lys Thr Val Ala Val Val Gly  
 195 200 205

Ile Gly Ile Asn Phe Val Leu Pro Lys Glu Val Glu Asn Ala Ala Ser  
 210 215 220

Val Gln Ser Leu Phe Gln Thr Ala Ser Arg Arg Gly Asn Ala Asp Ala  
 225 230 235 240

Ala Val Leu Leu Glu Thr Leu Leu Ala Glu Leu Asp Ala Val Leu Leu  
 245 250 255  
 Gln Tyr Ala Arg Asp Gly Phe Ala Pro Phe Val Ala Glu Tyr Gln Ala  
 260 265 270  
 Ala Asn Arg Asp His Gly Lys Ala Val Leu Leu Leu Arg Asp Gly Glu  
 275 280 285  
 Thr Val Phe Glu Gly Thr Val Lys Gly Val Asp Gly Gln Gly Val Leu  
 290 295 300  
 His Leu Glu Thr Ala Glu Gly Lys Gln Thr Val Val Ser Gly Glu Ile  
 305 310 315 320  
 Ser Leu Arg Ser Asp Asp Arg Pro Val Ser Val Pro Lys Arg Arg Asp  
 325 330 335  
 Ser Glu Arg Phe Leu Leu Leu Asp Gly Gly Asn Ser Arg Leu Lys Trp  
 340 345 350  
 Ala Trp Val Glu Asn Gly Thr Phe Ala Thr Val Gly Ser Ala Pro Tyr  
 355 360 365  
 Arg Asp Leu Ser Pro Leu Gly Ala Glu Trp Ala Glu Lys Val Asp Gly  
 370 375 380  
 Asn Val Arg Ile Val Gly Cys Ala Val Cys Gly Glu Phe Lys Lys Ala  
 385 390 395 400  
 Gln Val Gln Glu Gln Leu Ala Arg Lys Ile Glu Trp Leu Pro Ser Ser  
 405 410 415  
 Ala Gln Ala Leu Gly Ile Arg Asn His Tyr Arg His Pro Glu Glu His  
 420 425 430  
 Gly Ser Asp Arg Trp Phe Asn Ala Leu Gly Ser Arg Arg Phe Ser Arg  
 435 440 445  
 Asn Ala Cys Val Val Val Ser Cys Gly Thr Ala Val Thr Val Asp Ala  
 450 455 460  
 Leu Thr Asp Asp Gly His Tyr Leu Gly Gly Thr Ile Met Pro Gly Phe  
 465 470 475 480  
 His Leu Met Lys Glu Ser Leu Ala Val Arg Thr Ala Asn Leu Asn Arg  
 485 490 495  
 His Ala Gly Lys Arg Tyr Pro Phe Pro Thr Thr Thr Gly Asn Ala Val  
 500 505 510  
 Ala Ser Gly Met Met Asp Ala Val Cys Gly Ser Val Met Met Met His  
 515 520 525  
 Gly Arg Leu Lys Glu Lys Thr Gly Ala Gly Lys Pro Val Asp Val Ile  
 530 535 540  
 Ile Thr Gly Gly Gly Ala Ala Lys Val Ala Glu Ala Leu Pro Pro Ala  
 545 550 555 560

Phe Leu Ala Glu Asn Thr Val Arg Val Ala Asp Asn Leu Val Ile His  
565 570 575

Gly Leu Leu Asn Leu Ile Ala Ala Glu Gly Gly Glu Ser Glu His Thr  
580 585 590

<210> 23

<211> 753

<212> DNA

<213> Clostridium acetobutylicum

<400> 23

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aataagagag cagcttttat gctgctctta tttttaagga gtgtattaaa agtgatttta 60
gttttagatg ttggcaatac taatatagtg ttagggaatat acaatgatac gaaactttaca 120
gctgaatgga gactatcaac agatgtatta agatctgctg acgaatatgg aattcaagta 180
atgaacttat ttcaacaaga taagctcgat ccaacattag ttgagggagt aataatatcc 240
tctgtttgtac ctaatatcat gtattcttta gaacatatga taagaaagta ctttaagata 300
aatccattag ttgttggacc tggataaaaa acaggaatta atattaaata cgataatcct 360
aaagaagttg gagccgacag aattgtaaat gctgtagcag cacatgaaat ttataaaaga 420
tctcttataa taatagattt tggaaacagca actacatttt gtgcagtaag agaaaatgga 480
gattatcttg gtggagcaat atgccctgga attaaagttt catcagaggc tctttttgaa 540
aaggcagcta agcttccaag agtagagctc ataaaaccag cgtatgctat ttgtaaaaat 600
actatttcaa gtatacaatc tggaaattgtt tatcgatacc tacgtcaggt aaaatactta 660
tttgaaaaat tgaagaaaaa cctgccggac ggaaggagaa caaggacctc cttggtattg 720
gccacaggtg gtcttgccaa acttattaat tga 753
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<210> 24

<211> 798

<212> DNA

<213> Streptomyces coelicolor

<400> 24

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atgctgtgta cgatcgacgt agggaacacg cacaccgtcc tcggcctctt cgacggcgag 60
gacatcgctg agcactggcg catctccacg gactcgcgcc gcacggccga cgaactggcg 120
gtgctcctcc agggcctcat gggcatgcat cccctcctcg gcgacgaact gggcgacggc 180
atcgacggca tcgccatctg cgcgacggtc cctcctcgcc tcacgaact gcgcgaggtc 240
accgcgcgt actacggcga cgtccccgcg gtccctcgctg aaccgggcgt caagaccggc 300
gtcccgatcc tcaccgacca cccaaggag gtccggcgccg accgcatcat caacgcggta 360
gcgcccgctg agctctacgg cggcccggcg atcgtcgtgg acttcggcac ggcgacgacg 420
ttcgacggcg tcagcgcgcg cggggagtag atcggcgcg tcatcgcccc cggcatcgag 480
atctcggtcg aggcgctggg cgtcaaggac gccagctcc gcaagatcga ggtggcgcg 540
ccccgcagcg tgatcgga gaacacggtc gaggcgatgc agtccggcat cgtgtacggc 600
ttcgccggcc aggtcgacgg cgtcgtcaac cgcacggcg gggagctggc cgacgacccg 660
gacgacgtga cggtcacgcg gacggggcgg ctggcgccga tggctcctgg cgagtcctcg 720
gtcatcgacg agcagagacc gtggctgacg ctgatgggtc tgcgcctggt gtacgagcgc 780
aacgtgtcgc gcatgtag 798
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<210> 25

<211> 819

<212> DNA

<213> Mycobacterium tuberculosis

<400> 25

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aaagagcacg caaaggctgt gcagcagtg cggatacgca ccgaatccga agtcaccgcc 120
gacgaactgg cactgacgat cgacgggctg atcggcgagg attccgagcg gctcaccggc 180
accgccgcct tgtccacggc cccgtccgtg ctgcacgagg tgcggataat gctcgaccag 240
tactggccgt ccgtgcgcga cgtgctgac gagcccgag tacgcaccgg gatccctttg 300
ctcgtcgaca accgaagga agtggggcga gaccgcacg tgaactgttt ggccgcctat 360
gaccggttcc ggaaggccgc catcgtcgtt gactttggat cctcgatctg tgttgatgtt 420
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gtatcgGCCa aggggtgaatt tcttggcggc gccatcgcgC cgggggtgca ggtgtcttcc 480
gatgccgcgg cggcccgctc ggccggcattg cgccgcgttg aacttgcccG cccacgttcg 540
gtgggttgGca agaaccaccgt cgaatgcatg caagccggtg cgggtgttcgg cttcgccggg 600
ctggtagacg ggttggtagg ccgcatccgc gaggacgtgt ccggtttctc cgtcgaccac 660
gatgtcgGca tctgtggctac cgggcataacc ggcgccctgc tctgtccgga attgcacacc 720
gtcgaccatt acgaccagca cctgaccttg cagggtctgc ggctggtgtt cgagcgtaac 780
ctcgaagtcC agcgcggccg gctcaagacg gcgcgctga 819

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&lt;210&gt; 26

&lt;211&gt; 777

&lt;212&gt; DNA

<213> *Rhodobacter capsulatus*

&lt;400&gt; 26

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atgctttttgt gcatcgactg cggcaacacc aacaccgtgt tttcgggtctg ggacggggacg 60
gatttcgcccG ccacctggcg catcgccacc gatcatcgcc gcaccgcoga cgaatatttc 120
gtctggctga acacgctgat gcaactgaag ggcctgcagg gccggatctc cgaggcgatc 180
atctcctcga ccgcgcgcgg ggtggtgttc aacctgcgcg ttctgtgcaa ccgtatttc 240
gactgcgcgc cctatgtcgt cggcaaaccg ggctgcgagc tgccggtggc gccgcgcgtc 300
gatccgggGca ccacggtcgg gccggaccgg ctggtcaata cggtggcggg ctatgaccgt 360
catggcggcg atctgatcgt cgtcgatttc ggcaccgcca ccacctttga cgtgggtggc 420
cccgatggcg cctatatcgg cgggggtgat gcgccgggg tgaacctgag ccttgaggcg 480
ctgcatatgg cggcggccgc gctgcgcgat gtcgacgtca cgaaaccgca aggggtgatc 540
ggcacgaata cgggtggcctg catccaatcc ggggtgtatt ggggtatat cggccttgct 600
gaaggcatcg tgcggcagat ccgcatggaa cgtgaccgtc cgatgaagggt gattgccacc 660
gggggtcttg cctcgctctt cgatctgggt ttcgatctgt tcgacaagggt cgaggatgac 720
ctgaccatgc atggtctgcg tctgatcttc gattacaaca agggacttgg ggcgtga 777

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&lt;210&gt; 27

&lt;211&gt; 768

&lt;212&gt; DNA

<213> *Geobacter sulfurreducens*

&lt;400&gt; 27

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gtgcttcttg ttatagacgt gggtaataacc aatatcgtgc tcgggattta cgatggcgag 60
cgcttgggtga gggattggcg ggtctccacg gacaaggccc gtactaccga cgagtacggt 120
attctcataa atgagttgtt ccgcttggcg ggccttgggc tcgatcagat ccgcgcggtg 180
atcatctcct cgggtggtgcc gcccctcacc ggcgtgctgg agcgtctttc cctggggtat 240
ttcgggatgc gtcccctggt ggtgggaccg ggcatacaaga caggcatgcc aatccagtac 300
gacaaccccc gggagggtggg ggccgaccgg atcgtgaacg cggtggcggg gtacgagaag 360
taccgcacct ctctcattat cgtcgatttc ggcaccgcta ccacgttcga ctacgtgaac 420
cgcaaggag agtactgcgg aggggccatc gcgccgggac tctgcatttc caccgaggcc 480
ctgttcacagc gggccagcaa gctgccagg gttgatatca tacgtccgtc cgcgatcatt 540
gccaggaaca cggatcaatc gatgcaggcg ggaatttact atggttacgt ggggctcgta 600
gacgagatcg taccocggat gaaggccgag agcaaggatg cgcgccgggt tatcgctacc 660
ggagggttgg cgtccctcat agcgcgggag tccaagacca tcgaagccgt cgagggaatat 720
ctgacactgg agggattgcg catactgtac gaacgaaaca gggagtga 768

```

&lt;210&gt; 28

&lt;211&gt; 789

&lt;212&gt; DNA

<213> *Deinococcus radiodurans*

&lt;400&gt; 28

```

gtgccgcgtt ttcccctgct cgccgtggac atcggcaaca ccaccaccgt cctgggtctg 60
gccgacgcct cggggcgcct gaccacacc tggcggattc ggaccaaccg cgagatgctg 120
cccgacgacc tcgcgctgca actgcaaggg ctctttaccG tcgccggggc gccgattccc 180
cgcgccgcgg tctgtagcag cgtggcgccc ccggtgggGg aaaactacgc gctcgcgctc 240
aagcggcact tcatgatcga cgtttttgGc gtgagtgcGg agaacctgcc cgacgtgacg 300
gtggaactcg acacgcgggG ctoggtgggt gcggaccgcc tgtgcaacct cttcggcgcc 360
gaaaagtacc tgggggggGt ggactacgGg gtggtagtgg atttcgggac ctccaccaac 420

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tttgacgtgg tggggcgggg gcggcgtttc ctccggcgga tctcgccac cggagcgcag 480
gtcagcgccg acgccctgtt cggccgcgcc gccaaactgc cgcgcacac cctgcaagcg 540
cccgagacgg ccatcggcaa aaacaccgtc cacgcgctgc aatcgggcct ggtcttcggc 600
tacgccgaga tgggtggacgg cctgctgcgc cgcacccgcg ccgagttgcc gggcgaagcg 660
gtcgcgctcg ccactggcgg cttctcgcgc accgtgcagg ggatttgcca ggaaatcgac 720
tactacgacg aaacgctgac gttgcgcggg ttggtggagc tgtggcgag cgttcggag 780
gtccgctga

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&lt;210&gt; 29

&lt;211&gt; 741

&lt;212&gt; DNA

<213> *Thermotoga maritima*

&lt;400&gt; 29

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ttgtacctcc tcgtggacgt gggtaacacg cattctgtct tctctatcac cgaagatggt 60
aaaactttca gaaggtggag gctgtccacc ggtgtgtttc agacggaaga cgaactcttt 120
tcacaccttc atcctcttct gggcgatgct atgcgtgaga taaaggggat aggagtggcc 180
tccgtcgttc ccactcagaa cacagtcata gagcgttttt ctcaaaagta tttccacata 240
tcaccgatat ggggtgaaggc gaaaaacgga tgtgtgaaat ggaacgtgaa gaatccctcg 300
gaagtgggtg ctgatagggt ggccaacggt gtcgctttcg tcaaggaata cggtaaaaaac 360
ggaatcatca tcgacatggg aacggcaacc accgtggatc ttgttgtgaa cggatcttac 420
gaaggaggag ccattttgcc tggattcttc atgatggttc actcgctctt tcggggaacg 480
gcaaaacttc cgctcgttga ggtaaaacca gcggattttg ttgtaggaaa ggatacggag 540
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gtgaaagata tgataaaaca cgagattttc gatgaggacc tcacgatcaa ggggggtgtac 720
catttctgct tcggagattg a

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&lt;210&gt; 30

&lt;211&gt; 822

&lt;212&gt; DNA

<213> *Treponema pallidum*

&lt;400&gt; 30

```

atgcttttga tagacgtagg gaactcgcac gtagtgttcg gaatccaagg cgagaatggt 60
ggcgtgtgt gcgctcgtga gttgtttcgc cttgcgectg acgcgcgtaa aaccaagat 120
gagtactcgc ttctcatcca tgcgctttgc gaacgtgcgg gggtcggccg tgcttctctc 180
cgtgatgctg ttatttcctc cgtcgtgcct gtgttgacaa agaccattgc agatgcggtc 240
gtcagatta gcggcgtcca gccggttgtc tttggcccg gggcgtaaga gcacttgccg 300
gtgcgcatac cagagccagt gcgcgcggaa attggcactg acttggtagc caacgcggtg 360
goggcctatg tgcatttcgg ttctgcttgc gtggtagtgg attgtggaac agcgtcacc 420
tttacggcgg tggatggcac ggggttgatt caaggggtgg caattgcgcc tggctcgcgc 480
actgcgggtg agtctctcca tacaggaacg gcacaattac cacttggtcc tottgccctg 540
cctgattccg ttctgggcaa ggatactacg catgcggtgc aggcgggtgt ggtgcggggc 600
acgtcttttg ttattcgcgc tatgattgca cagtgtcaga aagagttagg gtgccgctgt 660
gcagcgggtg taacgggggg gctttcgcgt cttttctcgt cagaggtgga ctttcctcct 720
atcgatgcac agctgacgct ctcaggtctt gcacatattg cgcggtggt gccgacatct 780
ctcctgccac ctgctacagt gtcaggttca tcggggaatt ga

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&lt;210&gt; 31

&lt;211&gt; 789

&lt;212&gt; DNA

<213> *Borrelia burgdorferi*

&lt;400&gt; 31

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atgaataaac ctttattatc agaattgata attgatattg gaaataccag cattgctttt 60
gccttattta agataatca agttaattta tttattaaaa tgaaaacaaa tcttatgtta 120
aggatgatga aggttttatg cttttttgaa gaaaattttg attttaagt aaataaagt 180
tttataagca cgttgtttcc tattcttaat gaaacattta aaaatgtcat tttttctttt 240
tttaagataa agcctttgtt tattggtttt gatttgaatt atgatttgac atttaatcct 300

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tacaaaagcg ataaattttt gctaggttca gacgtttttg ccaatcttgt tgcagccatt 360
gaaaattatt catttgaaaa tgttttagta gtagaccttg gaactgcttg caccattttt 420
gctgttagca ggcaagatgg aatactcggg ggtattataa attctgggcc tttgataaat 480
tttaattctt tattagataa tgcctatctt atcaaaaaat tccccattag cactccaaat 540
aatcttttag agagaacgac atctgggagt gtaaacagcg gtttatttta tcaatataag 600
tatttaaatag aaggtgttta tcgtgatatt aagcagatgt ataaaaaaaa atttaattta 660
ataattactg ggggtaatgc ggacctaat ttgtcattaa ttgagataga gtttattttt 720
aatattcatt taactgtaga aggcgttaga attttaggaa attctattga ctittaagttt 780
gttaattga 789

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&lt;210&gt; 32

&lt;211&gt; 690

&lt;212&gt; DNA

&lt;213&gt; Aquifex aeolicus

&lt;400&gt; 32

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atgagggtttt tgacggtaga cgtagggaat tcctccgttg atatcgccct atgggaagggg 60
aagaaagtaa aagattttct gaaactttca cacgaagaat ttttaaagga agaatttcct 120
aaattaaaaag cgctcggaat atccgtaaaa cagagtttta gcgaaaaagt aaggggaaaa 180
ataccgaaga taaagttttt aaagaaggaa aactttccta tacaggttga ttacaaaact 240
cctgaaacgc tgggcacgga cagggttagca cttgcttact ccgccaaaaa gttttacgga 300
aagaatgttg tagtaatcag tgcgggtact gcccttgtaa ttgacctagt tcttgagggc 360
aaatttaagg gagggtttat taccttagga cttggaaaga agttaaaaat tctttccgac 420
ctggcggagg gaattcccga gttttttccc gaagaggtag aaatttttct tgggcgttct 480
acacgagagt gcgtcctggg aggggcttac agggagagca cagaatttat taaaagtaca 540
ctgaaactct ggagaaaagt atttaaaaga aagttcaaag tggttataac gggcggagag 600
gggaagtact tttccaagtt cgggtatttac gaccactcc ttgttcacag gggcatgaga 660
aatttacttt acctctatca caggatttaa 690

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&lt;210&gt; 33

&lt;211&gt; 774

&lt;212&gt; DNA

&lt;213&gt; Synechocystis sp.

&lt;400&gt; 33

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gtggaaacat caaagccggg ttgtggttta gccctggata atgacaagca aaaaccttgg 60
ttaggcctaa tgataggcaa ctcccgtctg cactgggcat attgtagcgg caatgctccc 120
ctgcaaacct gggttacaga ttacaacccc aagtcagctc agttgccggg tttgttgggg 180
aaagttcctc tgatgttggc atcgggtgga ccggaacaaa ccgaagtttg gcgagtatat 240
cagcctaaaa ttttgacctt gaagaatctt cccctggtea atctttaccc cagctttggc 300
attgaccggg ccctggcttg tttagggacg gggctgacct acggctttcc ctgtctagt 360
gttgatggag gcactgcttt gaccattaca ggttttgacc aagataaaaa actggtgggg 420
ggagcgatct tgcccgtttt gggattgcag tttagcaacc ttggcgatcg cctggcggcc 480
ctaccgaagt tagaaatgga tcaattaacc gagttgcctg accgttgggc tttagatacc 540
cccagcgcca ttttttagtg tgttgtctat ggcgtgttgg gggcattgca gagttatctc 600
caggattggc aaaagctttt tcctggtgcc gccatggtta tcaccggggg agacggcaag 660
atattacatg gcttcctaaa agagcattct cctaattctt cgggtggcctg ggatgacaat 720
ttgatcttcc tcggtatggc ggccatacac cacggcgatc gccccatctg ttag 774

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&lt;210&gt; 34

&lt;211&gt; 672

&lt;212&gt; DNA

&lt;213&gt; Helicobacter pylori

&lt;400&gt; 34

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atgccagcta ggcaatcttt caaggattta aaagacttga ttttatgcga tataggcaac 60
acacgcatcc atttcgcgca aaactaccag ctcttttcaa gcgctaaaga agatttaaag 120
cgtttgggta ttcaaaagga aatttttttac attagtgtga atgaagaaaa tgaaaaagct 180
cttttaaatt gttaccctaa cgctaaaaat atcgcagggt tttttcattt agaaaccgac 240
tatatagggc ttgggataga ccggcaaatg gcatgtttag cgggtggttaa tgggggttata 300

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gtggatgctg ggagcgcgat tacgattgat ttagtcaaag agggcaagca tttaggaggg 360
tgtattttgc ccggttttagc ccaatatgtc catgcgtata aaaaaagcgc gaaaatctta 420
gagcaacctt tcaaagcctt agattcttta gaagttttac caaaaaacac cagagacgct 480
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aaaatctatc tttgtggggg cgatgcgaaa tatttgagcg cgtttttacc tcattctgtt 600
tgcaaggagc gtttggtttt tgacgggatg gaaatcgctc ttaaaaaagc agggatacta 660
gaatgcaaat ga 672

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&lt;210&gt; 35

&lt;211&gt; 747

&lt;212&gt; DNA

<213> *Pseudomonas aeruginosa*

&lt;400&gt; 35

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atgattcttg agctcgactg tggaaactcg ctgatcaagt ggcggtcat cgagggggcg 60
gcgcggtcgg tcgcccgtgg ccttgccgag tccgatgatg ccctggtcga acagttaacg 120
tcgcagcaag cgctgccagt gcgagcctgt cgcttggtga gcgttcgcag cgagcaggaa 180
acctcgcaac tggtcgcacg gttggagcag ctgttcccgg tttcggcgct ggttgcacat 240
tcgggcaagc agttggcggg tgtgcgcaac ggctatctcg attaccagcg cctggggctc 300
gacgcgtggc tggccctcgt cgcggctcat cacctggcta agaaggcctg cctggtcatt 360
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cgctacgacg atgcagaggc cggcgggggc cttgccagtc tccagccagg gcagggcacg 540
gccgaggcgg ttgagcgggg ttgtctgctc atgtcaggg ggttcgttcg tgagcagtag 600
gccatggcgt gcgagctgct cggtcgggat tgtgaaatat tcctgacggg tggggatgcc 660
gaactggttc gcgacgaact ggctggcgcc cggatcatgc cggacctggt ttcgtaggg 720
ctggcactgg cttgcccgat tgagtga 747

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&lt;210&gt; 36

&lt;211&gt; 630

&lt;212&gt; DNA

<213> *Campylobacter jejuni*

&lt;400&gt; 36

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atgttgctct gtgatattgg gaattcaaat gctaatttcc tagatgataa caaatatatt 60
actcttaata tagatcagtt tttagaattt aaaaatgaac aaaaaatttt ttatatcaat 120
gtcaatgaac atctcaaaga acatttaaaa aatcaaaaaa attttatcaa tcttgaacct 180
tattttttat ttgatacaat ttatcaagga ttaggaatcg atcgcatagc agcttggtat 240
actattgaag atggagttgt ttagatgca ggtagtgtca ttacaattga tattatttct 300
aattctatac atcttggtgg ttttatcttg ccaggatttg caaattataa aaaaatttat 360
agccatattt caccacgatt aaaaagtga tttaacactc aagttagtct tgatgcattc 420
ccacaaaaaa ccatggatgc tttaaagttat ggtgttttta aaggaattta cctactgata 480
aaagatgccg ctcaaaaataa aaagctttat ttcactggtg gagatgggca attttttagc 540
aattatttct atcacgcaat ttatgataaa cttttaatct ttcgaggaat gaaaaagatt 600
ataaaaagaa atcccaattt actttattaa 630

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&lt;210&gt; 37

&lt;211&gt; 1779

&lt;212&gt; DNA

<213> *Neisseria meningitidis*

&lt;400&gt; 37

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atgacggttt tgaagccttc gcaactggcg gtgttgccgg agcttgccga cggtttgccg 60
caacacgtct cgcaactggc gcgtatggcg gatatgaagc cgcagcagct caacggtttt 120
tggcagcaga tgccggcgca catacgcggg ctgttgogcc aacacgacgg ctattggcgg 180
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tttgctggg tgtttgaccg gccgcagtat gagtgggtt cgctgtcgcc tgttgccgca 480
gtggcgtgcc ggccgcctt gtgcggtttg ggtttgaaaa cgcaaatcaa gtggccaaac 540

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gatttgggtcg tcggacgcga caaattgggc ggcattctga ttgaaacggt caggacgggc 600
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caaggcgttc tgcacttggg aacggcagag ggcaaacaga cggtcgtcag cggcgaaatc 960
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gcaaccgtcg gtagcgcgcc gtaccgcgat ttgtcgctt tgggcgcgga gtgggcggaa 1140
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caagtgcagg aacagctcgc ccgaaaaatc gagtggctgc cgtcttccgc acaggctttg 1260
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tttttgccgg aaaataccgt gcgcgtggcg gacaacctcg tcattcacgg gctgctgaac 1740
ctgattgccg ccgaaggcgg ggaatcgga cactacttaa 1779

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&lt;210&gt; 38

&lt;211&gt; 804

&lt;212&gt; DNA

&lt;213&gt; Bordetella pertussis

&lt;400&gt; 38

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atgattatcc tcatcgactc cggcaacagc cgcctcaaag tcggctggtt tgaccocggac 60
ggcgccgagg cggcgcgcca gccgcggccc gtgcgcttcg acaatctcga cctggacgcg 120
ctgggcgcgt ggctggccac cctgcccagg cgcccgcaac gggcgctggg cgtgaacgtc 180
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gacaatgtct tcccggcgcg gctgaccccg ccgggccccg ccatgatgcg cggcgcgctg 480
gcctacggca ccgcccacct gccctgggcc gacggcctgg tggccgacta ccccatcgac 540
acccatcagg ccategcacg cggcatcgcc gccgcggcgg ccggcgcgat cgtgcggcaa 600
tggttgggcg gccgccaacg ctacggccag gcgcgggaga tctatgtcgc cggcgcgggg 660
tggcccgagg tgccggcagg agccgagcgc ctgctggcgg tcaccggcgc cgccttcggc 720
gccacgcgcg agcccacta cctcgacagc cccgtgctcg acggcctggc ggcgctcgcc 780
gcgcaaggcg cgccaacggc ctga 804

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&lt;210&gt; 39

&lt;211&gt; 460

&lt;212&gt; PRT

&lt;213&gt; Neisseria gonorrhoeae

&lt;400&gt; 39

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Met Gly Glu Cys Leu Met Phe Ser Phe Gly Trp Ala Phe Asp Arg Pro
  1                      5                      10                      15

Gln Tyr Glu Leu Gly Ser Leu Ser Pro Val Ala Ala Leu Ala Cys Arg
          20                      25                      30

Arg Ala Leu Gly Cys Leu Gly Leu Glu Thr Gln Ile Lys Trp Pro Asn
          35                      40                      45

Asp Leu Val Val Gly Arg Asp Lys Leu Gly Gly Ile Leu Ile Glu Thr

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50	55	60
Val Arg Ala Gly Gly Lys Thr Val Ala Val Val Gly Ile Gly Ile Asn 65 70 75 80		
Phe Val Leu Pro Lys Glu Val Glu Asn Ala Ala Ser Val Gln Ser Leu 85 90 95		
Phe Gln Thr Ala Ser Arg Arg Gly Asn Ala Asp Ala Ala Val Leu Leu 100 105 110		
Glu Thr Leu Leu Ala Glu Leu Gly Ala Val Leu Glu Gln Tyr Ala Glu 115 120 125		
Glu Gly Phe Ala Pro Phe Leu Asn Glu Tyr Glu Thr Ala Asn Arg Asp 130 135 140		
His Gly Lys Ala Val Leu Leu Leu Arg Asp Gly Glu Thr Val Cys Glu 145 150 155 160		
Gly Thr Val Lys Gly Val Asp Gly Arg Gly Val Leu His Leu Glu Thr 165 170 175		
Ala Glu Gly Glu Gln Thr Val Val Ser Gly Glu Ile Ser Leu Arg Pro 180 185 190		
Asp Asn Arg Ser Val Ser Val Pro Lys Arg Pro Asp Ser Glu Arg Phe 195 200 205		
Leu Leu Leu Glu Gly Gly Asn Ser Arg Leu Lys Trp Ala Trp Val Glu 210 215 220		
Asn Gly Thr Phe Ala Thr Val Gly Ser Ala Pro Tyr Arg Asp Leu Ser 225 230 235 240		
Pro Leu Gly Ala Glu Trp Ala Glu Lys Ala Asp Gly Asn Val Arg Ile 245 250 255		
Val Gly Cys Ala Val Cys Gly Glu Ser Lys Lys Ala Gln Val Lys Glu 260 265 270		
Gln Leu Ala Arg Lys Ile Glu Trp Leu Pro Ser Ser Ala Gln Ala Leu 275 280 285		
Gly Ile Arg Asn His Tyr Arg His Pro Glu Glu His Gly Ser Asp Arg 290 295 300		
Trp Phe Asn Ala Leu Gly Ser Arg Arg Phe Ser Arg Asn Ala Cys Val 305 310 315 320		
Val Val Ser Cys Gly Thr Ala Val Thr Val Asp Ala Leu Thr Asp Asp 325 330 335		
Gly His Tyr Leu Gly Gly Thr Ile Met Pro Gly Phe His Leu Met Lys 340 345 350		
Glu Ser Leu Ala Val Arg Thr Ala Asn Leu Asn Arg Pro Ala Gly Lys 355 360 365		
Arg Tyr Pro Phe Pro Thr Thr Thr Gly Asn Ala Val Ala Ser Gly Met 370 375 380		

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Met Asp Ala Val Cys Gly Ser Ile Met Met Met His Gly Arg Leu Lys  
385 390 395 400

Glu Lys Asn Gly Ala Gly Lys Pro Val Asp Val Ile Ile Thr Gly Gly  
405 410 415

Gly Ala Ala Lys Val Ala Glu Ala Leu Pro Pro Ala Phe Leu Ala Glu  
420 425 430

Asn Thr Val Arg Val Ala Asp Asn Leu Val Ile His Gly Leu Leu Asn  
435 440 445

Leu Ile Ala Ala Glu Gly Gly Glu Ser Glu His Ala  
450 455 460

<210> 40

<211> 1383

<212> DNA

<213> Neisseria gonorrhoeae

<400> 40

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gtcgccgaag ccctgcgcgc tgcatttttg gcgaaaata ccgtgcgcgt ggcggaacac 1320
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taa 1383

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<210> 41

<211> 244

<212> PRT

<213> Porphyromonas gingivalis

<400> 41

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Ala Phe Val Arg Asn Asn Ser Ile Glu Ser Ile Ser Phe Leu Pro Gly  
20 25 30

Lys Ala Gly Gln Ala Leu Ser His Leu Val Ala Pro His Arg Phe Asp

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<210> 42
<211> 735
<212> DNA
<213> Porphyromonas gingivalis
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<400> 42							
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taataattga	tataaa						735

<210> 43  
 <211> 592  
 <212> PRT  
 <213> Neisseria meningitidis

<400> 43  
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                   20                  25                  30  
 Lys Pro Gln Gln Leu Asn Gly Phe Trp Gln Gln Met Pro Ala His Ile  
                   35                  40                  45  
 Arg Gly Leu Leu Arg Gln His Asp Gly Tyr Trp Arg Leu Val Arg Pro  
           50                  55                  60  
 Leu Ala Val Phe Asp Ala Glu Gly Leu Arg Glu Leu Gly Glu Arg Ser  
           65                  70                  75                  80  
 Gly Phe Gln Thr Ala Leu Lys His Glu Cys Ala Ser Ser Asn Asp Glu  
                   85                  90                  95  
 Ile Leu Glu Leu Ala Arg Ile Ala Pro Asp Lys Ala His Lys Thr Ile  
                   100                  105                  110  
 Cys Val Thr His Leu Gln Ser Lys Gly Arg Gly Arg Gln Gly Arg Lys  
           115                  120                  125  
 Trp Ser His Arg Leu Gly Glu Cys Leu Met Phe Ser Phe Gly Trp Val  
           130                  135                  140  
 Phe Asp Arg Pro Gln Tyr Glu Leu Gly Ser Leu Ser Pro Val Ala Ala  
           145                  150                  155                  160  
 Val Ala Cys Arg Arg Ala Leu Ser Arg Leu Gly Leu Asp Val Gln Ile  
                   165                  170                  175  
 Lys Trp Pro Asn Asp Leu Val Val Gly Arg Asp Lys Leu Gly Gly Ile  
                   180                  185                  190  
 Leu Ile Glu Thr Val Arg Thr Gly Gly Lys Thr Val Ala Val Val Gly  
           195                  200                  205  
 Ile Gly Ile Asn Phe Val Leu Pro Lys Glu Val Glu Asn Ala Ala Ser  
           210                  215                  220  
 Val Gln Ser Leu Phe Gln Thr Ala Ser Arg Arg Gly Asn Ala Asp Ala  
           225                  230                  235                  240  
 Ala Val Leu Leu Glu Thr Leu Leu Val Glu Leu Asp Ala Val Leu Leu  
                   245                  250                  255  
 Gln Tyr Ala Arg Asp Gly Phe Ala Pro Phe Val Ala Glu Tyr Gln Ala  
           260                  265                  270  
 Ala Asn Arg Asp His Gly Lys Ala Val Leu Leu Leu Arg Asp Gly Glu  
           275                  280                  285

Thr Val Phe Glu Gly Thr Val Lys Gly Val Asp Gly Gln Gly Val Leu  
 290 295 300  
 His Leu Glu Thr Ala Glu Gly Lys Gln Thr Val Val Ser Gly Glu Ile  
 305 310 315 320  
 Ser Leu Arg Ser Asp Asp Arg Pro Val Ser Val Pro Lys Arg Arg Asp  
 325 330 335  
 Ser Glu Arg Phe Leu Leu Leu Asp Gly Gly Asn Ser Arg Leu Lys Trp  
 340 345 350  
 Ala Trp Val Glu Asn Gly Thr Phe Ala Thr Val Gly Ser Ala Pro Tyr  
 355 360 365  
 Arg Asp Leu Ser Pro Leu Gly Ala Glu Trp Ala Glu Lys Ala Asp Gly  
 370 375 380  
 Asn Val Arg Ile Val Gly Cys Ala Val Cys Gly Glu Phe Lys Lys Ala  
 385 390 395 400  
 Gln Val Gln Glu Gln Leu Ala Arg Lys Ile Glu Trp Leu Pro Ser Ser  
 405 410 415  
 Ala Gln Ala Leu Gly Ile Arg Asn His Tyr Arg His Pro Glu Glu His  
 420 425 430  
 Gly Ser Asp Arg Trp Phe Asn Ala Leu Gly Ser Arg Arg Phe Ser Arg  
 435 440 445  
 Asn Ala Cys Val Val Val Ser Cys Gly Thr Ala Val Thr Val Asp Ala  
 450 455 460  
 Leu Thr Asp Asp Gly His Tyr Leu Gly Gly Thr Ile Met Pro Gly Phe  
 465 470 475 480  
 His Leu Met Lys Glu Ser Leu Ala Val Arg Thr Ala Asn Leu Asn Arg  
 485 490 495  
 His Ala Gly Lys Arg Tyr Pro Phe Pro Thr Thr Thr Gly Asn Ala Val  
 500 505 510  
 Ala Ser Gly Met Met Asp Ala Val Cys Gly Ser Val Met Met Met His  
 515 520 525  
 Gly Arg Leu Lys Glu Lys Thr Gly Ala Gly Lys Pro Val Asp Val Ile  
 530 535 540  
 Ile Thr Gly Gly Gly Ala Ala Lys Val Ala Glu Ala Leu Pro Pro Ala  
 545 550 555 560  
 Phe Leu Ala Glu Asn Thr Val Arg Val Ala Asp Asn Leu Val Ile Tyr  
 565 570 575  
 Gly Leu Leu Asn Met Ile Ala Ala Glu Gly Arg Glu Tyr Glu His Ile  
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&lt;210&gt; 44

&lt;211&gt; 1779

&lt;212&gt; DNA



<213> *Neisseria meningitidis*

&lt;400&gt; 44

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ctggtgcgcc cattggcggg ttctgatgcc gaaggtttgc gcgagctggg ggaaaggtcg 240
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tttggctggg tggttgaccg gccgcagtat gaggttgggt cgtgtgcgcc tgttgcggca 480
gtggcgtgtc ggcgcgctt gtgcgcttta ggtttggatg tgcagattaa gtggccaat 540
gatttggttg tcggacgcga caaattgggc ggcatctga ttgaaacggt caggacgggc 600
ggcaaaacgg ttgccgtggt cggtatcggc atcaattttg tcctgcccaa ggaagtagaa 660
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atgattgccg ccgaaggcag ggaatatgaa catatttaa 1779

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&lt;210&gt; 45

&lt;211&gt; 262

&lt;212&gt; PRT

<213> *Bacillus anthracis*

&lt;400&gt; 45

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Met Ile Phe Val Leu Asp Val Gly Asn Thr Asn Ala Val Leu Gly Val
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Phe Glu Glu Gly Glu Leu Arg Gln His Trp Arg Met Glu Thr Asp Arg
      20             25             30

His Lys Thr Glu Asp Glu Tyr Gly Met Leu Val Lys Gln Leu Leu Glu
      35             40             45

His Glu Gly Leu Ser Phe Glu Asp Val Lys Gly Ile Ile Val Ser Ser
      50             55             60

Val Val Pro Pro Ile Met Phe Ala Leu Glu Arg Met Cys Glu Lys Tyr
      65             70             75             80

Phe Lys Ile Lys Pro Leu Val Val Gly Pro Gly Ile Lys Thr Gly Leu
      85             90             95

Asn Ile Lys Tyr Glu Asn Pro Arg Glu Val Gly Ala Asp Arg Ile Val
      100            105            110

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Asn Ala Val Ala Gly Ile His Leu Tyr Gly Ser Pro Leu Ile Ile Val  
115 120 125

Asp Phe Gly Thr Ala Thr Thr Tyr Cys Tyr Ile Asn Glu Glu Lys His  
130 135 140

Tyr Met Gly Gly Val Ile Thr Pro Gly Ile Met Ile Ser Ala Glu Ala  
145 150 155 160

Leu Tyr Ser Arg Ala Ala Lys Leu Pro Arg Ile Glu Ile Thr Lys Pro  
165 170 175

Ser Ser Val Val Gly Lys Asn Thr Val Ser Ala Met Gln Ser Gly Ile  
180 185 190

Leu Tyr Gly Tyr Val Gly Gln Val Glu Gly Ile Val Lys Arg Met Lys  
195 200 205

Glu Glu Ala Lys Gln Glu Pro Lys Val Ile Ala Thr Gly Gly Leu Ala  
210 215 220

Lys Leu Ile Ser Glu Glu Ser Asn Val Ile Asp Val Val Asp Pro Phe  
225 230 235 240

Leu Thr Leu Lys Gly Leu Tyr Met Leu Tyr Glu Arg Asn Ala Asn Leu  
245 250 255

Gln His Glu Lys Gly Glu  
260

<210> 46  
<211> 789  
<212> DNA  
<213> Bacillus anthracis

<400> 46  
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tatggaagtc cgcttattat tgcgattttt ggtacggcta ctacatattg ttatatatac 420  
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gaaggatttg ttaagcgcac gaaagaggaa gctaaacaag aaccgaaagt tattgcaaca 660  
ggtggatttg cgaaattaat ttcagaagaa tcgaatgtga ttgatgttgt agatccattt 720  
ttaacattaa aaggtttgta tatgtttatac gagcgggaatg caaatttaca gcatgagaaa 780  
ggtgaataa 789

<210> 47  
<211> 254  
<212> PRT  
<213> Bacillus halodurans

<400> 47  
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Tyr Gln Asp Glu Thr Leu Val His His Trp Arg Leu Ala Thr Ser Arg  
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 Gln Lys Thr Glu Asp Glu Tyr Ala Met Thr Val Arg Ser Leu Phe Asp  
                   35                                  40                                  45  
 His Ala Gly Leu Gln Phe Gln Asp Ile Asp Gly Ile Val Ile Ser Ser  
                   50                                  55                                  60  
 Val Val Pro Pro Met Met Phe Ser Leu Glu Gln Met Cys Lys Lys Tyr  
                   65                                  70                                  75                                  80  
 Phe His Val Thr Pro Met Ile Ile Gly Pro Gly Ile Lys Thr Gly Leu  
                                   85                                  90                                  95  
 Asn Ile Lys Tyr Asp Asn Pro Lys Glu Val Gly Ala Asp Arg Ile Val  
                   100                                  105                                  110  
 Asn Ala Val Ala Ala Ile Glu Leu Tyr Gly Tyr Pro Ala Ile Val Val  
                   115                                  120                                  125  
 Asp Phe Gly Thr Ala Thr Thr Tyr Cys Leu Ile Asn Glu Lys Lys Gln  
                   130                                  135                                  140  
 Tyr Ala Gly Gly Val Ile Ala Pro Gly Ile Met Ile Ser Thr Glu Ala  
                   145                                  150                                  155                                  160  
 Leu Tyr His Arg Ala Ser Lys Leu Pro Arg Ile Glu Ile Ala Lys Pro  
                                   165                                  170                                  175  
 Lys Gln Val Val Gly Thr Asn Thr Ile Asp Ser Met Gln Ser Gly Ile  
                   180                                  185                                  190  
 Phe Tyr Gly Tyr Val Ser Gln Val Asp Gly Val Val Lys Arg Met Lys  
                   195                                  200                                  205  
 Ala Gln Ala Glu Ser Glu Pro Lys Val Ile Ala Thr Gly Gly Leu Ala  
                   210                                  215                                  220  
 Lys Leu Ile Gly Thr Glu Ser Glu Thr Ile Asp Val Ile Asp Ser Phe  
                   225                                  230                                  235                                  240  
 Leu Thr Leu Lys Gly Leu Gln Leu Ile Tyr Lys Lys Asn Val  
                   245                                  250

&lt;210&gt; 48

&lt;211&gt; 765

&lt;212&gt; DNA

&lt;213&gt; Bacillus halodurans

&lt;400&gt; 48

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 atgacggtgc gttctctctt tgatcatgca ggtctacagt ttcaagacat agacggcatt 180  
 gtcatttcat ctgttggtccc accgatgatg ttttccttag agcaaagtgt caaaaaatac 240  
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 gacaatccaa aagaggttgg ggccgatcga atcggttaat cagttgcagc gattgagtta 360  
 tatggctacc ctgccattgt cgttgatttt ggaacagcaa caacatattg cttaattaat 420  
 gaaaaaaaac aatatgcagg gggagtcatt gctcctggaa tcatgatctc aacagaagcg 480  
 ttgtatcatc gcgcatcaaa attgccacgg attgaaatag cgaagccgaa acaagtcgta 540

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ggtgggcttg cgaagttaat cggaaccgag tcggaaacca ttgatgtaat cgattcgttt 720
ttaacattaa aaggattgca actcatttat aagaagaatg tctga 765

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&lt;210&gt; 49

&lt;211&gt; 258

&lt;212&gt; PRT

&lt;213&gt; Bacillus stearothermophilus

&lt;400&gt; 49

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Met Ile Phe Val Leu Asp Val Gly Asn Thr Asn Thr Val Leu Gly Val
  1             5             10             15

Tyr Asp Gly Asp Glu Leu Lys His His Trp Arg Ile Glu Thr Ser Arg
      20             25             30

Ser Lys Thr Glu Asp Glu Tyr Gly Met Met Ile Lys Ala Leu Leu Asn
      35             40             45

His Val Gly Leu Gln Phe Ser Asp Ile Arg Gly Ile Ile Ile Ser Ser
      50             55             60

Val Val Pro Pro Ile Met Phe Ala Leu Glu Arg Met Cys Leu Lys Tyr
      65             70             75             80

Phe His Ile Lys Pro Leu Ile Val Gly Pro Gly Ile Lys Thr Gly Leu
      85             90             95

Asp Ile Lys Tyr Asp Asn Pro Arg Glu Val Gly Ala Asp Arg Ile Val
      100            105            110

Asn Ala Val Ala Gly Ile His Leu Tyr Gly Ser Pro Leu Ile Ile Val
      115            120            125

Asp Phe Gly Thr Ala Thr Thr Tyr Cys Tyr Ile Asn Glu His Lys Gln
      130            135            140

Tyr Met Gly Gly Ala Ile Ala Pro Gly Ile Met Ile Ser Thr Glu Ala
      145            150            155            160

Leu Phe Ala Arg Ala Ala Lys Leu Pro Arg Ile Glu Ile Ala Arg Pro
      165            170            175

Asp Asp Ile Ile Gly Lys Asn Thr Val Ser Ala Met Gln Ala Gly Ile
      180            185            190

Leu Tyr Gly Tyr Val Gly Gln Val Glu Gly Ile Val Ser Arg Met Lys
      195            200            205

Ala Lys Ser Lys Ile Pro Pro Lys Val Ile Ala Thr Gly Gly Leu Ala
      210            215            220

Pro Leu Ile Ala Ser Glu Ser Asp Ile Ile Asp Val Val Asp Pro Phe
      225            230            235            240

Leu Thr Leu Thr Gly Leu Lys Leu Leu Tyr Glu Lys Asn Thr Glu Lys
      245            250            255

Lys Gly

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<210> 50  
 <211> 777  
 <212> DNA  
 <213> *Bacillus stearothermophilus*

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 gacaatccgc gtgaggtggg cgccgaccgg attgtcaacg cggttgccgg catccatttg 360  
 tacggcagtc cgctgattat cgtcgatttt ggcacggcga cgacgtattg ttatattaat 420  
 gaacataaac aatatatggg agggggccatt gcccgggaa ttatgatctc gacagaggct 480  
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 ggcggtttgg ctccgctcat tgccagcgaa tcggacatca tcgatgtcgt tgatccggtt 720  
 ttgacgctga ctggcttaaa attgttgtac gagaaaaaca ccgagaaaaa aggatga 777

<210> 51  
 <211> 260  
 <212> PRT  
 <213> *Caulobacter crescentus*

<400> 51  
 Met Leu Leu Ala Ile Glu Gln Gly Asn Thr Asn Thr Met Phe Ala Ile  
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 His Asp Gly Ala Ser Trp Val Ala Gln Trp Arg Ser Ala Thr Glu Ser  
                   20                  25                  30  
 Thr Arg Thr Ala Asp Glu Tyr Val Val Trp Leu Ser Gln Leu Leu Ser  
           35                  40                  45  
 Met Gln Gly Leu Gly Phe Arg Ala Ile Asp Ala Val Ile Ile Ser Ser  
           50                  55                  60  
 Val Val Pro Gln Ser Ile Phe Asn Leu Arg Asn Leu Ser Arg Arg Tyr  
           65                  70                  75                  80  
 Phe Asn Val Glu Pro Leu Val Ile Gly Glu Asn Ala Lys Leu Gly Ile  
                   85                  90                  95  
 Asp Val Arg Ile Glu Lys Pro Ser Glu Ala Gly Ala Asp Arg Leu Val  
           100                  105                  110  
 Asn Ala Ile Gly Ala Ala Met Val Tyr Pro Gly Pro Leu Val Val Ile  
           115                  120                  125  
 Asp Ser Gly Thr Ala Thr Thr Phe Asp Ile Val Ala Ala Asp Gly Ala  
           130                  135                  140  
 Phe Glu Gly Gly Ile Ile Ala Pro Gly Ile Asn Leu Ser Met Gln Ala  
           145                  150                  155                  160  
 Leu His Glu Ala Ala Ala Lys Leu Pro Arg Ile Ala Ile Gln Arg Pro  
           165                  170                  175

Ala Gly Asn Arg Ile Val Gly Thr Asp Thr Val Ser Ala Met Gln Ser  
                   180                  185                  190

Gly Val Phe Trp Gly Tyr Ile Ser Leu Ile Glu Gly Leu Val Ala Arg  
           195                  200                  205

Ile Lys Ala Glu Arg Gly Glu Pro Met Thr Val Ile Ala Thr Gly Gly  
       210                  215                  220

Val Ala Ser Leu Phe Glu Gly Ala Thr Asp Ser Ile Asp His Phe Asp  
   225                  230                  235                  240

Ser Asp Leu Thr Ile Arg Gly Leu Leu Glu Ile Tyr Arg Arg Asn Thr  
                   245                  250                  255

Ile Ala Glu Ser  
           260

<210> 52  
 <211> 783  
 <212> DNA  
 <213> Caulobacter crescentus

<400> 52  
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 tcgtgggtcg cgcagtggcg gtcagcgacc gaaagcacgc gcacggccga tgagtacgtc 120  
 gtctggcttt cgcaactgct gtcgatgcag gggcttggct tccgggcgat cgacgccgtg 180  
 atcattttcca gcgtcgtgcc gcagtcgatc ttcaatctgc gcaacctgag ccgccgctac 240  
 ttcaacgtcg agcctctggt catcggtgag aacgccaagc tgggcattga tgtccgcatac 300  
 gagaaaccct ccgaggccgg cgccgaccgc ctggtcaacg ccattggcgc ggcgatggtc 360  
 tatccgggtc cgctggctgt gatcgacagc ggcaccgcga cgacgttcga catcgtggcc 420  
 gccgacggcg ccttcgaggg cggtattatc gcgcccggt tcaacctgtc gatgcaggct 480  
 ctgcacgagg cggcgggcga gctgccgcgc atcgccatcc agcgtccgcg cggtaacagg 540  
 atcgtgggca cggacacggt ctccgccatg cagtccggcg tcttctgggg ctatatattcg 600  
 ctgatogaag gctcgtcgc gcggatcaag gccgagcgcg gcgagcctat gaccgttatc 660  
 gccacgggtg gcgtcgctc gctgttcgag ggcgcgaccg acagcattga ccacttcgac 720  
 tctgatctga cgatccgggg tcttctcgaa atctaccgcc gaaacaccat cgccgagtcc 780  
 tga 783

<210> 53  
 <211> 257  
 <212> PRT  
 <213> Chlorobium tepidum

<400> 53  
 Met Arg Leu Val Val Asp Ile Gly Asn Thr Ser Thr Thr Leu Ala Ile  
   1                  5                  10                  15

Phe Thr Gly Asp Glu Glu Pro Ser Val Glu Ser Val Pro Ser Ala Leu  
           20                  25                  30

Phe Ala Asp Ser Ser Thr Met Arg Glu Val Phe Gly Asn Met Ala Arg  
           35                  40                  45

Lys His Gly Glu Pro Gln Ala Ile Ala Ile Cys Ser Val Val Pro Ser  
       50                  55                  60

Ala Thr Ala Val Gly Ser Ala Leu Leu Glu Ser Leu Phe Ser Val Pro  
       65                  70                  75                  80

Val Leu Thr Ile Cys Cys Lys Leu Arg Phe Pro Phe Arg Leu Asp Tyr  
                     85                    90                    95

Ala Thr Pro His Thr Phe Gly Ala Asp Arg Leu Ala Leu Cys Ala Trp  
                     100                    105                    110

Ser Arg His Leu Phe Ser Glu Lys Pro Val Ile Ala Val Asp Ile Gly  
                     115                    120                    125

Thr Ala Ile Thr Phe Asp Val Leu Asp Thr Val Gly Asn Tyr Arg Gly  
                     130                    135                    140

Gly Leu Ile Met Pro Gly Ile Asp Met Met Ala Gly Ala Leu His Ser  
                     145                    150                    155                    160

Arg Thr Ala Gln Leu Pro Gln Val Arg Ile Asp Arg Pro Glu Ser Leu  
                     165                    170                    175

Leu Gly Arg Ser Thr Thr Glu Cys Ile Lys Ser Gly Val Phe Trp Gly  
                     180                    185                    190

Val Val Lys Gln Ile Gly Gly Leu Val Asp Ala Ile Arg Gly Asp Leu  
                     195                    200                    205

Val Arg Asp Phe Gly Glu Ser Thr Val Glu Val Ile Val Thr Gly Gly  
                     210                    215                    220

Asn Ser Arg Ile Ile Val Pro Glu Ile Gly Pro Val Ser Val Ile Asp  
                     225                    230                    235                    240

Glu Leu Ala Val Leu Arg Gly Ser Asp Leu Leu Leu Arg Met Asn Met  
                     245                    250                    255

Pro

<210> 54  
 <211> 774  
 <212> DNA  
 <213> Chlorobium tepidum

<400> 54  
 gtgcggctgg tcgttgacat cggcaatacc agcacgacgt tggcgatttt caccggtgat 60  
 gaagagccgt cggtcgagtc ggtaccgagt gcgttgtttg ccgattccag cacaatgcgc 120  
 gaagtgtttg gcaacatggc ccggaagcac ggcgagccac aggccatcgc catttcgagc 180  
 gtggtgcctt ccgctaccgc cgtcggttcg gcgcttctcg aatcactttt ctccgtaccg 240  
 gtgctgacca tctgctgtaa gctccgtttt ccttttcgtc tcgactacgc aaccccgcac 300  
 accttcggcg cggatcgctt tgccctgtgc gcatggagcc gacatctctt ttctgaaaaa 360  
 ccggttatcg ccgtcgatat cggcacggcc atcaccttcg acgtgctcga cacggtgggg 420  
 aattatcgcg gtggtctcat catgccgggt atcgacatga tggccggagc gcttcattcg 480  
 agaaccgccc agcttcccca ggtgcgcata gacaggccgg agagccttct cgggcgctcg 540  
 acgaccgaat gcatcaaaag cggagttttc tggggagtgg tcaaacagat cggcggcctc 600  
 gtggacgcca ttgcggcgga ccttgtacgc gactttggcg agtcaacggc cgaagtgatt 660  
 gtcaccggcg gcaatagcag gattatcggt ccggagatcg gccctgtcag tggtatcgac 720  
 gaactcgctg tctcgcgcgg cagcgatctt ttgctgcgga tgaatatgcc gtga 774

<210> 55  
 <211> 256  
 <212> PRT  
 <213> Clostridium difficile

&lt;400&gt; 55

Met Leu Leu Val Phe Asp Val Gly Asn Thr Asn Met Val Leu Gly Ile  
 1 5 10 15

Tyr Lys Gly Asp Lys Leu Val Asn Tyr Trp Arg Ile Lys Thr Asp Arg  
 20 25 30

Glu Lys Thr Ser Asp Glu Tyr Gly Ile Leu Ile Ser Asn Leu Phe Asp  
 35 40 45

Tyr Asp Asn Val Asn Ile Ser Asp Ile Asp Asp Val Ile Ile Ser Ser  
 50 55 60

Val Val Pro Asn Val Met His Ser Leu Glu Asn Phe Cys Ile Lys Tyr  
 65 70 75 80

Cys Lys Lys Gln Pro Leu Ile Val Gly Pro Gly Ile Lys Thr Gly Leu  
 85 90 95

Asn Ile Lys Tyr Asp Asn Pro Lys Gln Val Gly Ala Asp Arg Ile Val  
 100 105 110

Asn Ala Val Ala Gly Ile Glu Lys Tyr Gly Ala Pro Ser Ile Leu Val  
 115 120 125

Asp Phe Gly Thr Ala Thr Thr Phe Cys Ala Ile Ser Glu Lys Gly Glu  
 130 135 140

Tyr Leu Gly Gly Thr Ile Ala Pro Gly Ile Lys Ile Ser Ser Glu Ala  
 145 150 155 160

Leu Phe Gln Ser Ala Ser Lys Leu Pro Arg Val Glu Leu Ala Lys Pro  
 165 170 175

Gly Met Thr Ile Cys Lys Ser Thr Val Ser Ala Met Gln Ser Gly Ile  
 180 185 190

Ile Tyr Gly Tyr Val Gly Leu Val Asp Lys Ile Ile Ser Ile Met Lys  
 195 200 205

Lys Glu Leu Asn Cys Asp Asp Val Lys Val Ile Ala Thr Gly Gly Leu  
 210 215 220

Ala Lys Leu Ile Ala Ser Glu Thr Lys Ser Ile Asp Tyr Val Asp Gly  
 225 230 235 240

Phe Leu Thr Leu Glu Gly Leu Arg Ile Ile Tyr Glu Lys Asn Gln Glu  
 245 250 255

&lt;210&gt; 56

&lt;211&gt; 771

&lt;212&gt; DNA

&lt;213&gt; Clostridium difficile

&lt;400&gt; 56

atgcttctag tatttgatgt tggaaatact aatatggttt taggtatata taaaggtgac 60  
 aaattagtta attactggag aattaaaaca gatagggaaa aaacgtctga tgaatatgga 120  
 atcctgataa gtaacctatt tgattatgat aatgtgaata taagtatat tgatgatgtt 180  
 ataatatcat ctgtagttcc gaatgttatg cattctcttg aaaacttttg tataaagtac 240



```

tgtaaaaaaac agccattaat agtaggtcca ggcataaaaa caggtctaaa tataaaatat 300
gataatccaa aacaagttgg ggcagataga atagttaatg ctgtagcagg gatagaaaag 360
tatggagcac caagtatact tgttgatttt ggaacagcaa ctacattttg tgctatctct 420
gaaaaaggtg aatattttggg tggaacaata gcaccaggaa taaaaatata tagtgaggcg 480
ttatttcaaa gtgctgtctaa attacctaga gtagaattag ctaagccagg tatgactatt 540
tgtaagagta ctgtatcagc catgcaatct ggaataattt atggatatgt tggtttagtt 600
gacaaaataa taagtattat gaagaaagaa ttgaattgtg atgatgttaa ggttatagct 660
acaggtggat tagctaaact gattgcttca gagacgaaaa gtatagatta tgtagatggt 720
tttttaacac tagaaggatt gagaataata tatgaaaaaa accaagaata a 771

```

&lt;210&gt; 57

&lt;211&gt; 219

&lt;212&gt; PRT

&lt;213&gt; Dehalococcoides ethenogenes

&lt;400&gt; 57

```

Met Ser Glu Lys Leu Val Ala Val Asp Ile Gly Asn Thr Ser Val Asn
  1             5             10             15

```

```

Ile Gly Ile Phe Glu Gly Glu Lys Leu Leu Ala Asn Trp His Leu Gly
      20             25             30

```

```

Ser Val Ala Gln Arg Met Ala Asp Glu Tyr Ala Ser Leu Leu Leu Gly
      35             40             45

```

```

Leu Leu Gln His Ala Gly Ile His Pro Glu Glu Leu Asn Arg Val Ile
      50             55             60

```

```

Met Cys Ser Val Val Pro Pro Leu Thr Thr Thr Phe Glu Glu Val Phe
      65             70             75             80

```

```

Lys Ser Tyr Phe Lys Ala Ala Pro Leu Val Val Gly Ala Gly Ile Lys
      85             90             95

```

```

Ser Gly Val Lys Val Arg Met Asp Asn Pro Arg Glu Val Gly Ala Asp
      100            105            110

```

```

Arg Ile Val Asn Ala Ala Ala Arg Val Leu Tyr Pro Gly Ala Cys
      115            120            125

```

```

Ile Ile Val Asp Met Gly Thr Ala Thr Thr Phe Asp Thr Leu Ser Glu
      130            135            140

```

```

Gly Gly Ala Tyr Ile Gly Gly Ala Ile Ala Pro Gly Ile Ala Thr Ser
      145            150            155            160

```

```

Ala Gln Ala Ile Ala Glu Lys Thr Ser Lys Leu Pro Lys Ile Glu Ile
      165            170            175

```

```

Ile Arg Pro Ala Lys Val Ile Gly Ser Asn Thr Val Ser Ala Met Gln
      180            185            190

```

```

Ser Gly Ile Tyr Phe Gly Tyr Ile Gly Leu Val Glu Glu Leu Val Arg
      195            200            205

```

```

Arg Ile Gln Thr Glu Leu Gly Gln Lys Thr Arg
      210            215

```

&lt;210&gt; 58

&lt;211&gt; 659

&lt;212&gt; DNA

&lt;213&gt; Dehalococcoides ethenogenes

&lt;400&gt; 58

```

atgtctgaaa aactggtggc ggtagatatc ggcaatacca gcgtaaatat aggtatatatt 60
gagggcgaaa aactgctggc aaactggcat ctgggttcgg ttgccacgcg tatggctgat 120
gaatatgcca gtctgctctt aggcctgttg cagcacgccg gtatacaccg ggaagagcta 180
aacagggtaa tcatgtgcag tgttgtgccg cccctgacca ctacttttga agaggtattt 240
aaaagctatt tcaaggctgc tcctctggta gtgggtgcag gtataaagag cggggttaag 300
gtgcgcacatg ataacccccg tgaggttggg gctgaccgca tagtaaatac cgctgccgcc 360
agggtgcttt atccgggggc gtgcataata gtggacatgg gtacggccac tacctttgat 420
accctttccg aggtggtggc atatataggc ggggcgattg cacccggtat tgccacctca 480
gcccaggcta ttgcggaaaa gacttcaaaa ctgcccaga ttgagataat cgtcctgcc 540
aaagtatcgc gctctaatac tgtgtcggt atgcagtcag gtatatactt cgttatatc 600
gggctggtgg aagagctggt caggcggtt caaactgaat tggggcagaa aaccagagt 659

```

&lt;210&gt; 59

&lt;211&gt; 212

&lt;212&gt; PRT

&lt;213&gt; Desulfovibrio vulgaris

&lt;400&gt; 59

```

Met Thr Gln His Phe Leu Leu Phe Asp Ile Gly Asn Thr Asn Val Lys
  1             5             10             15

Ile Gly Ile Ala Val Glu Thr Ala Val Leu Thr Ser Tyr Val Leu Pro
      20             25             30

Thr Asp Pro Gly Gln Thr Thr Asp Ser Ile Gly Leu Arg Leu Leu Glu
      35             40             45

Val Leu Arg His Ala Gly Leu Gly Pro Ala Asp Val Gly Ala Cys Val
      50             55             60

Ala Ser Ser Val Val Pro Gly Val Asn Pro Leu Ile Arg Arg Ala Cys
      65             70             75             80

Glu Arg Tyr Leu Tyr Arg Lys Leu Leu Phe Ala Pro Gly Asp Ile Ala
      85             90             95

Ile Pro Leu Asp Asn Arg Tyr Glu Arg Pro Ala Glu Val Gly Ala Asp
      100            105            110

Arg Leu Val Ala Ala Tyr Ala Ala Arg Arg Leu Tyr Pro Gly Pro Arg
      115            120            125

Ser Leu Val Ser Val Asp Phe Gly Thr Ala Thr Thr Phe Asp Cys Val
      130            135            140

Glu Gly Gly Ala Tyr Leu Gly Gly Leu Ile Cys Pro Gly Val Leu Ser
      145            150            155            160

Ser Ala Gly Ala Leu Ser Ser Arg Thr Ala Lys Leu Pro Arg Ile Ser
      165            170            175

Leu Glu Val Glu Glu Asp Ser Pro Val Ile Gly Arg Ser Thr Thr Thr
      180            185            190

Ser Leu Asn His Gly Phe Ile Phe Gly Phe Ala Ala Met Thr Glu Gly
      195            200            205

```

Val Leu Ala Ala  
210

<210> 60

<211> 639

<212> DNA

<213> *Desulfovibrio vulgaris*

<400> 60

```
atgacccagc atttcctgct gttcgacatc ggcaacacca acgtcaagat cggcatcgcg 60
gtggaaaccg ccgtgctgac ttcgtacgtg ctgcccacag accccggcca gacgaccgac 120
tccatcgggc tgcgcctgct ggaggtgctg cgccatgccg ggctgggacc ggcggacgtg 180
ggggcctgcg tggccagttc ggtggtgccc ggcgtaacc cgctgatccg ccgcgcctgc 240
gaacgttacc tgtatcgcaa gctgctgttc gccccggcg acatcgccat tccgctggac 300
aaccgctacg aacggcccg cgaagtgggc gcgaccggc tggggcggc ctatgccgcc 360
cggcggctgt accccggccc ccggtcgctg gtatccgtgg atttcggcac cgccaccacg 420
tttgactgcg tggaagggg tgcgtatctt ggtggtttga tctgtcccgg cgtgctgtcg 480
tccgccgggg cgttgctgct gcgcacggcc aagctgccgc gcatcagttt ggaagtggaa 540
gaggattcgc cggtcacg cggtccacc accaccagcc tgaaccacgg cttcattttc 600
ggctttgccg ccatgaccga aggggtgctg gccgcctga 639
```

<210> 61

<211> 249

<212> PRT

<213> *Pseudomonas putida*

<400> 61

```
Met Ile Leu Glu Leu Asp Cys Gly Asn Ser Phe Ile Lys Trp Arg Val
  1             5             10             15

Ile His Val Ala Asp Ala Val Ile Glu Gly Gly Gly Ile Val Asp Ser
      20             25             30

Asp Gln Ala Leu Val Ala Glu Val Ala Ala Leu Ala Ser Val Arg Leu
      35             40             45

Thr Gly Cys Arg Ile Val Ser Val Arg Ser Glu Glu Glu Thr Asp Ala
      50             55             60

Leu Cys Ala Leu Ile Ala Gln Ala Phe Ala Val Gln Ala Lys Val Ala
      65             70             75             80

His Pro Val Arg Glu Met Ala Gly Val Arg Asn Gly Tyr Asp Asp Tyr
      85             90             95

Gln Arg Leu Gly Met Asp Arg Trp Leu Ala Ala Leu Gly Ala Phe His
      100            105            110

Leu Ala Lys Gly Ala Cys Leu Val Ile Asp Leu Gly Thr Ala Ala Lys
      115            120            125

Ala Asp Phe Val Ser Ala Asp Gly Glu His Leu Gly Gly Tyr Ile Cys
      130            135            140

Pro Gly Met Pro Leu Met Arg Ser Gln Leu Arg Thr His Thr Arg Arg
      145            150            155            160

Ile Arg Tyr Asp Asp Ala Ser Ala Glu Arg Ala Leu Ser Ser Leu Ser
      165            170            175

Pro Gly Arg Ser Thr Val Glu Ala Val Glu Arg Gly Cys Val Leu Met
```

180 185 190  
 Leu Gln Gly Phe Ala Tyr Thr Gln Leu Glu Gln Ala Arg Val Leu Trp  
 195 200 205  
 Gly Glu Glu Phe Thr Val Phe Leu Thr Gly Gly Asp Ala Pro Leu Val  
 210 215 220  
 Arg Ala Ala Leu Pro Gln Ala Arg Val Val Pro Asp Leu Val Phe Val  
 225 230 235 240  
 Gly Leu Ala Met Ala Cys Pro Leu Asp  
 245

<210> 62  
 <211> 750  
 <212> DNA  
 <213> Pseudomonas putida

<400> 62  
 atgattcttg agctcgattg cggtaacagc ttcattcaagt ggcggggtgat ccatgtttgcc 60  
 gatgctgtga ttgaagggtg tgggatcgtc gattccgata aggcgctggt ggcggaagtg 120  
 gctgcgctcg ctacagtgcg tctcacgggt tgccgtattg tcagtgtgcg cagcgaagaa 180  
 gagaccgatg cgctttgcgc gttgattgct caggcatttg ccgtgcaggc gaagggtgcc 240  
 caccctgtcc gtgaaatggc aggtgtgcgc aatggctatg acgactatca gcgcctgggt 300  
 atggatcggt ggctggcggc gttgggggca tttcacctgg ccaagggcgc gtgcctgggtg 360  
 attgacctgg gtaccgcggc aaaagcggac ttcgtttctg cagatggcga gcatcttggg 420  
 ggctacatct gccaggtat gccattgatg cgtagccagc tgcgcactca caccgctcg 480  
 atccgctatg acgatgcctc cgcggagcgc gcattgagca gcttgtcacc aggtcgctcg 540  
 actgtcgaag cggtagagcg cggttgcgta ttgatgctcc agggctttgc ctacacccag 600  
 cttgagcagg ctctgtgtgt atggggtgag gagttcaccg tggttcctcac tggcggtgat 660  
 gcgccactgg tgagggcggc cctgccacag gcgcgggtcg tgcctgacct ggttttcggt 720  
 ggcttggaac tggcttgcgc attggattga 750

<210> 63  
 <211> 241  
 <212> PRT  
 <213> Thiobacillus ferrooxidans

<400> 63  
 Met Ile Phe Ile Ala Val Gly Asn Thr Arg Thr Leu Leu Ala His Thr  
 1 5 10 15  
 His Asp Gly Val His Phe Asp Ser Val Ser Val Ala Thr Ser Leu Pro  
 20 25 30  
 Pro Thr Glu Ile Leu Gln Gln Pro Gly Leu Thr Trp Leu Ser Ala Pro  
 35 40 45  
 Asn Arg Glu Pro Val Ala Leu Gly Gly Val Val Pro Ala Ala Leu Ala  
 50 55 60  
 Ala Trp Arg Glu Ala Leu Ala Thr Ala Glu Val Arg Glu Pro Asp Pro  
 65 70 75 80  
 Gly Phe Phe Arg Arg Ala Val Pro His Asp Tyr His Pro Pro Glu Ser  
 85 90 95  
 Leu Gly Phe Asp Arg Arg Cys Cys Leu Leu Ala Ala Ala Met Asp Tyr  
 100 105 110

Pro Gly Gln Asp Ser Ile Val Ile Asp Met Gly Thr Ala Ile Thr Ile  
 115 120 125

Asp Leu Leu Ala Gly Gly His Phe Arg Gly Gly Arg Ile Leu Pro Gly  
 130 135 140

Ile Ala Met Ser Leu Arg Gly Leu His Glu Gly Thr Ala Leu Leu Pro  
 145 150 155 160

Glu Val Val Leu Asn Ala Pro Ala Glu Met Leu Gly Asn Asp Thr Ser  
 165 170 175

Asn Ala Ile Gln Ala Gly Val Ile His Leu Phe Ala Asp Ala Leu Arg  
 180 185 190

Gly Ala Ile Thr Asp Phe Arg Gln Tyr Ser Pro Gln Ala Arg Ile Leu  
 195 200 205

Ile Thr Gly Gly Asp Ala Glu Arg Trp Gln Pro Gly Ile Ala Gly Ser  
 210 215 220

Leu Tyr Gln Pro His Leu Leu Leu Arg Gly Phe Tyr Leu Trp Ile Arg  
 225 230 235 240

Gly

<210> 64  
 <211> 726  
 <212> DNA  
 <213> Thiobacillus ferrooxidans

<400> 64  
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 catttcgaca gcgtcagcgt ggccacttcg ctgccacca cggaaatcct gcagcagccc 120  
 ggcttgacat ggctcagcgc gccgaaccgg gaaccgctcg cgctgggcgg cgctgtacct 180  
 ggggcgcttg ccgcctggcg ggaagccttg gccacggcag aggtccgcga acccgacccc 240  
 ggcttttttc gcgcgcgcgt gccgcacgac tatcatccgc cggaaagcct cggttttgac 300  
 cgccgttgct gctgtctcgc cgccgccatg gactacccc gccaggacag catcgtcatc 360  
 gacatgggca ccgccatcac catcgacctg ctggctggcg gacatttccg ggcgggacgc 420  
 attctgcggg gtatcgccat gagcctgcgc ggtctgcatg aaggcacggc actccttctc 480  
 gaagtcgtcc tgaacgcccc agcggaaatg ctgggcaatg acaccagcaa cgccattcag 540  
 gccgggggtc tccacctctt tgccgatgcc ctgcgcggcg ccattaccga ctttcgccag 600  
 tacagccccc aggcacggat actgatcacc ggtggcgatg ccgaacgttg gcaaccggcg 660  
 atcgttggtg gcctgtacca gcccctctg cttctgcgcg gcttttatct gtggatacgg 720  
 ggatga 726

<210> 65  
 <211> 242  
 <212> PRT  
 <213> Xylella fastidiosa

<400> 65  
 Met Asn Asp Trp Leu Phe Asp Leu Gly Asn Ser Arg Phe Lys Cys Ala  
 1 5 10 15

Ser Leu Arg Glu Gly Val Ile Gly Pro Val Thr Val Leu Pro Tyr Leu  
 20 25 30

Thr Glu Thr Met Asp Ala Phe Ala Leu Gln Glu Leu Pro Arg Gly Arg  
 35 40 45

Val Ala Tyr Leu Ala Ser Val Ala Ala Pro Ala Ile Thr Thr His Val  
 50 55 60

Leu Glu Val Leu Lys Ile His Phe Glu Gln Val Gln Val Ala Ala Thr  
 65 70 75 80

Val Ala Ala Cys Ala Gly Val Arg Ile Ala Tyr Ala His Pro Glu Arg  
 85 90 95

Phe Gly Val Asp Arg Phe Leu Ala Leu Leu Gly Ser Tyr Gly Glu Gly  
 100 105 110

Asn Val Leu Val Val Gly Val Gly Thr Ala Leu Thr Ile Asp Leu Leu  
 115 120 125

Ala Ala Asn Gly Cys His Leu Gly Gly Arg Ile Ser Ala Ser Pro Thr  
 130 135 140

Leu Met Arg Gln Ala Leu His Ala Arg Ala Glu Gln Leu Pro Leu Ser  
 145 150 155 160

Gly Gly Asn Tyr Leu Glu Phe Ala Glu Asp Thr Glu Asp Ala Leu Val  
 165 170 175

Ser Gly Cys Asn Gly Ala Ala Val Ala Leu Ile Glu Arg Ser Leu Tyr  
 180 185 190

Glu Ala His Gln Arg Leu Asp Gln Ser Val Arg Leu Leu Leu His Gly  
 195 200 205

Gly Gly Val Ala Ser Leu Leu Pro Trp Leu Gly Asp Val Val His Arg  
 210 215 220

Pro Thr Leu Val Leu Asp Gly Leu Ala Ile Trp Ala Ala Val Ala Ala  
 225 230 235 240

Asn Val

<210> 66

<211> 729

<212> DNA

<213> Xylella fastidiosa

<400> 66

atgaatgatt gggtattcga tctaggtaat tcgcgtttta aatgtgcatc gctcagggaa 60  
 ggtgtgattg gtcctgtaac gggtttgccc tacttaacag agaccatgga cgcgtttgcg 120  
 ttacaggagc taccacgtgg tcgtgtggct tacttgccga gtgtcgtgcg tccggctatt 180  
 actacacatg tgctcgaagt attaaaaatc cacttcgagc aagtccaggt ggctgcaacc 240  
 gtcgctgcat gtgcgggagt acgaattgcc tatgctcacc cggaacgttt tggagtggat 300  
 aggttcttag cggttgcttg ttcgatgggt gagggcaatg tcctggtagt ggggtgcggg 360  
 acagcattga ctattgattt gttggctgcc aatgggtgtc atctcgagg gcgtatcagt 420  
 gcttcaccga cattgatgcg ccaagcggtt catgcacgcg cggagcaact cccctcagt 480  
 ggtgggaact acttgaggtt tgcggaagat acagaggatg cggttggtgtc agggtgcaat 540  
 ggtgcagcgg tggcattgat cgaacgtagc ctgtatgagg cacatcaacg tttggaccag 600  
 tcggttcgat tattgttgca tgggtggagg gtagcatctt tattgccttg gttgggcgac 660  
 gtggtacatc gtcctacatt agtattggat ggccctggcga tctgggctgc cgttgcagct 720

aacgttttag

729

&lt;210&gt; 67

&lt;211&gt; 223

&lt;212&gt; PRT

&lt;213&gt; Helicobacter pylori

&lt;400&gt; 67

Met Pro Ala Arg Gln Ser Phe Thr Asp Leu Lys Asn Leu Val Leu Cys  
 1 5 10 15

Asp Ile Gly Asn Thr Arg Ile His Phe Ala Gln Asn Tyr Gln Leu Phe  
 20 25 30

Ser Ser Ala Lys Glu Asp Leu Lys Arg Leu Gly Ile Gln Lys Glu Ile  
 35 40 45

Phe Tyr Ile Ser Val Asn Glu Glu Asn Glu Lys Ala Leu Leu Asn Cys  
 50 55 60

Tyr Pro Asn Ala Lys Asn Ile Ala Gly Phe Phe His Leu Glu Thr Asp  
 65 70 75 80

Tyr Val Gly Leu Gly Ile Asp Arg Gln Met Ala Cys Leu Ala Val Asn  
 85 90 95

Asn Gly Val Val Val Asp Ala Gly Ser Ala Ile Thr Ile Asp Leu Ile  
 100 105 110

Lys Glu Gly Lys His Leu Gly Gly Cys Ile Leu Pro Gly Leu Ala Gln  
 115 120 125

Tyr Ile His Ala Tyr Lys Lys Ser Ala Lys Ile Leu Glu Gln Pro Phe  
 130 135 140

Lys Ala Leu Asp Ser Leu Glu Val Leu Pro Lys Ser Thr Arg Asp Ala  
 145 150 155 160

Val Asn Tyr Gly Met Val Leu Ser Val Ile Ala Cys Ile Gln His Leu  
 165 170 175

Ala Lys Asn Gln Lys Ile Tyr Leu Cys Gly Gly Asp Ala Lys Tyr Leu  
 180 185 190

Ser Ala Phe Leu Pro His Ser Val Cys Lys Glu Arg Leu Val Phe Asp  
 195 200 205

Gly Met Glu Ile Ala Leu Lys Lys Ala Gly Ile Leu Glu Cys Lys  
 210 215 220

&lt;210&gt; 68

&lt;211&gt; 672

&lt;212&gt; DNA

&lt;213&gt; Helicobacter pylori

&lt;400&gt; 68

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<223> Description of Artificial Sequence: plasmid, pAN341 and pAN342

<400> 71

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<223> Description of Artificial Sequence: plasmid, pAN329 and pAN330

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<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: plasmid, pOTP71

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<211> 3859

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: plasmid, pOTP72

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&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

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&lt;400&gt; 75

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# SEQ ID NO:69 *Pseudomonas syringae* pv *tomato* *coaX* coding sequence

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# SEQ ID NO:70 *Pseudomonas syringae* pv *tomato* *coaX* protein sequence

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SEQ ID NO:71 - pAN296

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SEQ ID NO:72 - pAN336

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